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[Founded in 1849 as the "Journal of Gas Lighting."]

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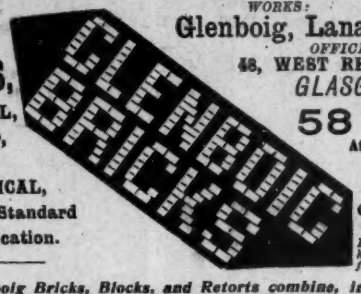

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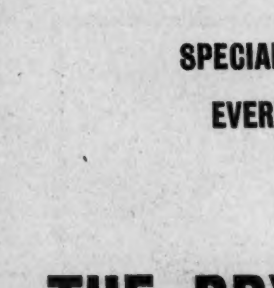
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VOL. CLXIX., No. 3220.] WEDNESDAY, JANUARY 28, 1925. [77TH YEAR.

EDITORIAL NOTES.

Trouble or Peace?

ALL large users of coal will be watching anxiously the proceedings in the coal industry from now onward until we approach, if nothing definite is settled before, the end of the current half-year. After May 1 the present agreement with the miners is terminable by either party giving a month's notice. The agreement is not satisfactory to either the owners or the miners; it is more unsatisfactory to the former than to the latter, although the miners express the opinion that they have the greatest grievance. The trouble is their leaders will not look the economic facts fairly and squarely in the face; their oblique glances at them giving them warning that too intimate an acquaintance with them would shatter even their own confidence in the case they must present to support that of the miners. We referred last week to some of the factors in the economic position of the industry which contribute to high production costs, incapacity for effectively meeting the increasing competition from the Continent—especially from Germany—loss of employment for 100,000 men in the industry, and lower pay for the miners themselves per shift than would be the case if the man-shift were more productive. Since that article was published there have been two important decisions by the Miners' Federation. They have accepted the invitation of the coalowners to a joint conference to consider the admittedly unsatisfactory position of the industry, and to investigate possible remedies—the conference to be attended by the full Committee of the Federation on Thursday this week. But we fear that nothing substantial can be done at the conference that day. It can simply be more or less preliminary, inasmuch as the Federation have also asked the districts to forward their proposals for a new wages agreement, which proposals are to be considered by the Executive, whose recommendations will be discussed at a national delegate conference on Feb. 26. What the wage proposals will be is an unknown quantity, though it may with fair safety be prognosticated that they will be in the upward direction, with no suggestion for giving commensurate additional work. Being an unknown quantity, nothing definite can issue from any conference between the owners and the Federation beyond such enlightenment as the members of the Committee of the latter choose to imbibe. Whether they will utilize the information to direct the aspirations of the miners to a legitimate level as to their pay and the amount of work they should render for it, is a matter concerning which it is unnecessary to express even an opinion; and as to investigating "possible remedies," there is no chance of the most important one being considered, much less entertained—that is, a greater production per shift by the lengthening of the latter by one hour, so reducing production costs. On this the leaders of the miners are resolute. It is the one thing they have gained, to the detriment of the industry and the miners—100,000, it may be repeated, being now unemployed, and wages per shift at the lowest in the areas where the production per shift is the lowest and the wages per ton of disposable coal the highest.

Mr. Herbert Smith, the President of the Federation, says that any attempt to revert to the eight-hour shift would be sure to provoke a severe conflict in the industry; and yet he adds there will be discontent if no means are found to increase the men's earnings. The Miners' Federation have to face the fact that the 100,000 miners are idle because there does not exist the coal business to call for their services; and there will be, unless we are very much misled by the signs of the times, more unemployment in the industry, owing largely to the foolish obstinacy that is being displayed. To improve matters, the miners must produce more coal at a lower cost per ton, which does not mean lower wages per shift. And when it is remembered that the production per man per shift is 3 cwt. lower than in 1913, the single fact bears witness to one of the main causes of high production costs, and the incapacity of the industry for maintaining its trade abroad. Over the seven-hour shift, the leaders argue illogically and persistently. Mr. Smith is a moderate, and we highly respect him. But in connection with this matter, he says: "As a result of "the evidence we presented to the Sankey Commission, "we established our case for a seven-hour working day. In "fact, we did more; for the Commission recommended that, "when an economic output was reached, the matter should "be again considered, and the working day further "reduced to six hours." Now instead of an economic output having been reached, we have seen a very serious recession from that condition. This being so, it shows that the case was not "established" for a seven-hour working day, and that the Commission were gravely mistaken in supposing that an economic output would be reached under such conditions, and in recommending that, in that event, the working day should be further reduced to six hours. If anything was established before the Commission for a reduction of hours, it has been completely disestablished by the results. Therefore, surely, the time has come for the position to be reviewed. The Commission were speaking without experience. Now that there has been experience, would the Commission say the same things to-day as they said in their report? Experience has spoken more truthfully than the evidence.

We are glad to see that, although there is a good deal of dissatisfaction with the rates of wages earned in the various Wage Board areas, Mr. Smith agrees that this is a matter which requires the most careful consideration, and that it should be looked at from every aspect before any definite action is taken by the Federation. The Executive are calling for proposals from the various areas. What do they suppose will be the result? A suggestion for more pay? There is no doubt about that, because the President asserts that the dissatisfaction in the industry is due to low earnings. Nothing is said by him as to the dissatisfaction that also exists in the industry—and outside it—as to the low output per man-shift. This is a matter which is ignored. Then again it is all very well for Mr. Smith to advise the men to attend their branch meetings, and to discuss the wage problem in all its bearings, so that practical proposals may be made by the Executive to the employers as the basis of negotiation to reach a peaceful settlement. The unfortunate thing is that many of the branch meetings are dominated and swayed by firebrands, and not by men of the calibre of Mr. Smith. At the same time, there is no question that the President is annoyed by what he describes as the "aimless talk about strikes and such things," which has aroused widespread contempt. He knows as well as other people that it is childish and not diplomatic to enter upon a course

of conference and negotiation by dangling threats before the other side and the nation, in the way that the Secretary of the Federation (Mr. A. J. Cook) has been doing. The President and other responsible members of the Executive cannot be pleased with their raucous-voiced colleague, whose political tenets, by the way, are exposed by a written speech which was read in his absence last Sunday at the Unity Conference of the National Minority Movement, the amiable and exhilarating objects of which include: "Wide agitation and propaganda for the principles of the revolutionary class struggle;" counteraction of "the present tendency towards a false social peace and class collaboration;" exposure of "the delusion of a peaceful transition from capitalism to socialism." These objects should assist in keeping the world alive, even if they do not contribute to progress and the making of things more comfortable for the community generally. It was Mr. Cook who recently gave the nation notice that, if the miners did not get what they wanted during the next few months, the country would have to face a battle. He is a comrade of those extremists who urge that the coal-owners should sell their coal at a higher price to industries in order that the miners may be paid more for producing 17 or 18 cwt. of coal (in some districts less) per shift, and their wages be brought more in line with the cost of living. What is wanted is that the cost of living should be reduced. But these so-called "leaders" would further raise the price of coal to industries, and so the costs of their production, which in turn would increase the cost of living, and produce more unemployment, through the greater incapacity of our industries to compete in the markets of the world. The conditions that oppose the aspirations of the miners for more pay for their inadequate average production per man are likely to become, through foolish leading, effectively stronger instead of weaker.

However, there are difficulties ahead. We hope they will not prove insoluble; but we fear they can only be solved by a complete conversion of the miners' leaders, and the dissemination by them of sane advice among the men. Neither they nor the owners can alter the economic conditions of the world, which, combined with the policy of the Miners' Federation, have brought the coal industry to its present parlous condition. Users of coal will note that if a peaceful solution cannot be reached, the agreement will end on June 30. At the moment no one can say what is likely to happen; but sellers of coal are anticipating an enlarged demand for storage purposes during the next few months.

Complete Gasification by Tully Plant.

THE members of the Yorkshire Junior Gas Association at their last meeting had before them two interesting subjects for discussion. A paper was submitted by Mr. F. J. Jackson, of Sheffield, on "The Valuation and Testing of Gas Coals." To this we shall refer next week. The second contribution was by Mr. J. Wilson, of Halifax, on "Complete Gasification by the Tully Method." This paper demonstrates that, when the Tully plant is worked, as all plants should be, under conditions that are found by trial and chemical and thermal testings to be the best, excellent therm results can be secured from it. A make of 183·3 therms per ton of coal is good; but we are not prepared, on even the data advanced by Mr. Wilson, to endorse all he has to say in favour of complete gasification. The system has its place—chiefly as a diluent for coal gas where blue or lightly carburetted water gas is not preferred for the purpose. It has also considerable value, when the markets are not in the best of conditions, in helping to maintain an equilibrium between the supply and demand of coke. We must, however, in considering gas-producing systems, maintain a proper perspective, in order to arrive at sound conclusions. Mr. Wilson says the chief reason for the choice of the subject for his paper is his conviction that complete gasification is the ideal method of gas manufacture. A thing to be ideal should be perfect in all particulars; and the paper does not confirm the view that in every respect complete gasification is ideal.

In the prefatory paragraph of the contribution, there are postulations as to coke. It is true that coke did not last year have such good markets as it had (say) the year before. But that does not justify the statement that "the German reparations scheme has successfully closed all foreign ports to the export of British coke, except at prices that scarcely pay for the loading of the trucks." Let us test this statement by the Board of Trade returns. If Mr. Wilson is right, then there were responsible gas managers who were foolish enough to export 965,739 tons of gas coke last year. The quantity mentioned was less than in 1923, when 1,224,302 tons were sent abroad; but it was more than in 1922, when 911,307 tons were sold to other countries. Then as to the author's point that the price received scarcely paid for its loading into trucks. The aggregate value of the coke exported last year was £1,684,303, which averages £1 14s. 10·5d. per ton. The value in 1923 was £1,990,532, which averages £1 12s. 6·2d. per ton. The value in 1922 was £1,287,079, which averages £1 8s. 2·9d. per ton. Thus the average value received last year for exported coke was 2s. 4·3d. better than in 1923, and 6s. 7·6d. better than in 1922. It seems to us that the author's views require a little modification respecting the sale of coke abroad, because it is partly on the lowness of the price that he builds his case for complete gasification as the "ideal" method of gas manufacture. Coke can only take part in that case when all efforts to extend the demand for it have been exhausted, and there is failure to maintain a fair balance between supply and demand. Moreover, we cannot bring ourselves to think that the other valuable necessaries contained in coal should be universally destroyed through the elevation of complete gasification to a common practice. Nevertheless, we repeat that complete gasification has its place, but not the capital position which manifestly Mr. Wilson thinks it should occupy.

In the paper the Tully plant at Halifax is described as well as the cycle of operation. The one adopted is the result of many experiments with various cycles to determine which was the best in the circumstances of the works. For the highest results it is also found that a good hard nut coal should be used. An "ideal" gas-producing system would be one which could employ any class of coal, and consistent with quality supply the maximum results. If all town gas was made by Tully plant, and all gas engineers sought good hard nut coal, the price of that variety would, we imagine, soar up to figures which would be forbidding for town gas supply purposes. In the gas industry, we want to keep as far away as possible from raising any particular class of coal to a preferential position. Another point that is not "ideal," and regarding which the experiences of other engineers would be useful, is that "Tully gas has rather a corrosive action on iron-work, especially in the presence of oxygen." A subsequent analysis shows the presence of 0·6 p.ct. of oxygen. The point was also raised in the discussion, when Mr. T. G. Lewis, of Leeds, suggested that any saving effected by Tully gas might be counterbalanced by the cost of service replacements and the expenses of the repair and renewal of meters. Further testimony as to the effect of the gas on meters was advanced by Mr. F. Bailey, of Cleckheaton; while Mr. C. H. Chester, of Wakefield, states that he has not found extensive corrosion, but has experienced a drying effect on the leather diaphragms of meters. Periodical lubrication, however, gets over the trouble in his case. The point is an interesting one, and should not be left there, inasmuch as, if the ascribed effects are really serious, no doubt means of correction could be applied as at Wakefield, which, however, would be an additional working charge—small it is true.

Working on the Halifax cycle, and using a good hard nut coal of the characteristics shown by analysis in the paper, the results are good. The data disclose a make of 53,911 c.ft. of 340 B.Th.U. gas, equal to 183·3 therms. The inerts, according to the analysis, amount to about 17 p.ct.; but this is not normal, and may be due to weakened valves. At the end of the paper Mr. Wilson states that the cost of coal per 1000 c.ft. will be below 6d. in some cases, and a little over 6d. in works where the expense of railway transport is high. That is a suggestive figure for a comparison. Taking a make of 54,000 c.ft., a level 6d. per 1000 c.ft. for coal would make its cost 27s. per ton. The 1000 c.ft. is equal to 3·4 therms; so that the cost of coal per therm would be approximately 1·76d. Take a coal-gas works making (say) 13,000 c.ft. per ton, realizing 72 therms, and paying 27s. per ton

delivered. If at the present time 66 p.ct. of the cost of the coal is returned in revenue from the secondary products, this would leave 9s. as the net cost of coal per ton. Dividing the 9s. by 72 therms, we have 1·5d. as the cost of coal per gas therm. We admit that this does not tell the whole tale, but Mr. Wilson himself does not go farther in his paper. So far, we do not think he proves his case that, even in the present circumstances of the secondary products market, complete gasification is the "ideal" thing for universal application in the manufacture of town gas.

An Early Annual Meeting.

THERE is not the slightest doubt that the proprietors in any commercial undertaking are curious to know as early as possible how the business has fared during the period since they last met. The desire is perhaps accentuated somewhat in the case of those stockholders in concerns which now have a meeting only once a year; but with gas and electricity companies a difficulty is that, in order to hold a meeting (say) within the first month of the close of a year, it is necessary to have an early reading of the meters—before the year has actually ended. This, of course, does not matter much providing the same period for the meter reading is adopted every succeeding year, otherwise the total of the business done may have an undeserved increase or decrease attached to it. The Aldershot Gas, Water, and District Lighting Company on this occasion have beaten not only their own previous good records for early accounts and meetings of the proprietors, but those of other companies in the industry. The meeting was held to-day, and the report of the interesting speech of the Chairman (Mr. R. W. Edwards) appears in later columns of this issue of the "JOURNAL." The credit for this smart work is due to the chief officers and members of the staffs in the Secretary's and Accountant's Departments; and in his address the Chairman gave them a hearty slap on the back for their achievement. The performance is all the more creditable in view of the fact that the undertaking is a tripartite one—gas, water, and electricity; and therefore an immense amount of work is involved. The tale the Chairman had to tell as to both the gas and electricity undertakings was good. It reflects the general experience, as to the growth in popularity of gas for both domestic and industrial purposes; and it also shows how much atmospherical conditions to-day influence the demand for gas. The Company's increase in consumption was 12½ p.ct.; and had it not been for the mild autumn, it would have been much more. On the other hand, the electricity undertaking presented an increase in sales of 44¾ p.ct. In speaking to ordinary stockholders, percentages such as these may be somewhat misleading; laymen might be pardoned for assuming that electricity was bounding forward at a much faster rate than gas. They do not recognize incomparables in the figures; and they overlook the quantitative basic data to which the percentages apply. If the percentages were translated into potential energy, the 12½ p.ct. increase for gas, we undertake to say, would transcend by far the 44¾ p.ct. for electricity. However, we confidently expect that, as the gas-business history of the year is unfolded in various quarters, we shall have the experience of the Aldershot Company closely followed not only in gas consumption, but in other respects. The Chairman stated that "the number of cookers put out during 1924 was very much in excess of any previous year, while the number of gas-fires is increasing and increasing week by week enormously, and these, together with the field of hot-water apparatus (which is showing the greatest promise), point to the fact that, if the seasons get out of joint, the consumption of gas by these various apparatus will be considerably influenced." Notwithstanding the fact that the markets for the secondary products have not during the year been of the character we should have liked to see—contributing only 66·8 p.ct. to the reduction of the cost of coal, as against 75·5 p.ct. in 1923—Mr. Edwards regards the gas business as presenting a most encouraging picture; and he is certain the gas industry will not suffer so long as its leaders are enlightened in their methods, and bold in the application of them. That is precisely our view.

In America as Here.

IN this country we have been heartily congratulating ourselves upon the progress of the gas business and its excellent prospects. We are not anxious for the latter to develop with a violent rush, as that would simply cause embarrassment, though we pride ourselves that the industry has proved itself capable of meeting big flights in demand when occasion has demanded. Development of business at a moderately quick speed is better for all concerned than something that threatens to overpower capacity. The rates of progress that have obtained during the last two years (when certain undertakings have shown per annum 8, 10, and even 14 p.ct. increase) are good from the standpoint of convenience. A much larger increase could, of course, in many cases be comfortably managed if it was realized simply by the process of levelling-up demand; but the gas industry is in this respect denied the most ideal conditions, though it works in every direction to establish them. Demand now depends very much upon that unruly factor the weather; and, in consequence, peaks are apt to shoot up very high from normal. However, there is good promise of a continuation this year of the advance of the gas business in this country, if the coal miners do not introduce disturbance into our national affairs after June. Our experiences of the last year or two are similar to those in the United States, and so are the prospects.

The American Gas Association Monthly has been circulating the views of prominent gas administrators as to the current outlook for gas business. A number of questions were put to them; one being as to whether prosperity would this year be general. Though the inquiries were put to men distantly situated one from the other, it is noteworthy how the replies are almost unanimously optimistic. Reading their opinions, it is clear that they attribute the present prosperity of the gas industry in the States to two or three things—the gradual return of confidence among manufacturers, despite the high costs of labour and materials; and the awakening there has been in the industry itself from the old conservatism in the conduct of the business, and the adoption of more modern methods of publicity and educational work, together with the development of more efficient appliances. Those things also apply in this country—the first cause perhaps in smaller degree; for until recently in the commercial and financial worlds here there has been a want of confidence. Yet the gas business has made notable progress; and the restoration of greater confidence in the industrial, commercial, and financial worlds is an advantage from which there is assurance the industry is going to reap well. In our opinion, the three things which have of late contributed most to our prosperity in the gas business are the enterprise of the industry in publicity and educational work, the growth in efficiency of gas-using appliances, and the continued high price of coal, which is not showing any signs of materially receding with miners' wages standing at something like 13s. 8d. per ton of disposable coal, and the production per man-shift at only 17·33 cwt.

One of the interrogated authorities in America states that the gas business in some towns is growing at a faster rate than the population, which in our view means that existing consumers are enlarging their use of gas—particularly for heating purposes—and increases of the kind through established services are really more profitable than those obtained by the extension of distribution pipes, and the laying of new services. Our American friends are looking for their largest developments in domestic and industrial heating, both of which fields have indefinable limits. In this country, we are also keen on both those fields, and work is proceeding which it is hoped will lead to a large conversion from the use of crude coal to the labour-saving, efficient, and non-smoke-producing gas. We agree with our American friends, that the gas business is to-day on a more stable foundation than it has ever been.

Coal and Coke Exports in 1924.

WITH the publication of the Board of Trade returns for December, a complete view is given of the serious set-back which the coal industry has suffered during the past twelve months in respect of its overseas coal and coke business.

Before dealing with the full year, let us glance at the returns for last month. The quantity of coal of all kinds exported was 5,167,525 tons, compared with 5,873,965 tons in 1923, and 5,954,642 tons in 1922. The values were: December, 1924, £5,571,766; 1923, £7,176,445; and 1922, £6,692,654. The part classified as gas coal represented 673,498 tons, as against 622,707 tons in 1923, and 759,486 tons in 1922. The values were: December, 1924, £713,969; 1923, £761,781; 1922, £849,195. The average value per ton of exported gas coal last month was £1 1s. 2·4d. The gas coke shipped only amounted to 81,187 tons, which contrasts badly with the 109,417 tons in December, 1923, and the 94,985 tons in December, 1922. The values were: December, 1924, £137,245; 1923, £189,028; 1922, £133,070. The average price last month was £1 13s. 9·7d.

It is when we come to the data for the whole year that the full significance of the decline in exports of both coal and coke is seen. The total quantity of coal shipped in the year was 61,651,273 tons, compared with 79,459,469 tons in 1923, and 64,198,384 tons in 1922, with values attached of £72,079,547 in 1924, £99,847,237 in 1923, and £72,529,500 in 1922. The average values per ton were: 1924, £1 3s. 3d.; 1923, £1 5s. 1d.; and 1922, £1 2s. 8d. Almost throughout the year there was a gradual slide in prices; the average for January being £1 4s. 5d., and for December £1 1s. 6d. The large difference between the total coal export business in 1924 and 1923 is represented by a fall of 17,808,196 tons, and a decline in values of £27,767,690. For gas-making purposes, the amount of coal shipped during the year was 8,434,869 tons; in 1923, 9,102,450 tons; and in 1922, 9,197,544 tons. The values were £9,565,862 in 1924, £11,058,880 in 1923, and £10,123,199 in 1922. Last year the average value per ton was £1 2s. 8d. With regard to gas coke, the shipments in the year totalled to 965,739 tons, compared with 1,224,302 tons in 1923, and 911,307 tons in 1922. The difference in the exported quantity last year and the previous one was 258,563 tons, and that of the value was £306,229. The returned aggregate value for the year was £1,684,303; that for 1923, £1,990,532; and for 1922, £1,287,079. This decline in sales abroad partly accounts for the gas industry not being in such good case in respect of the first of its secondary products. During the year "other sorts"—which means metallurgical—did overseas business to the amount of 1,847,672 tons; but that was a sad fall from the previous year's business—2,745,905 tons, although somewhat better than the shipments for 1922 (1,602,671 tons). The values of these quantities of metallurgical coke were: 1924, £2,999,822; 1923, £6,383,140; 1922, £2,352,971.

The figures quoted in this article show the acute setback in its foreign trade that the coal industry has suffered; and this, combined with the low level of industrial work in this country, helps to heap ridicule on the claim of the Miners' Federation that the men should now have more pay per shift, notwithstanding that they are winning per man 3 cwt. less coal per shift than they were in 1913. That 3 cwt., multiplied by over a million men, and again by the working days per annum, speaks emphatically of one important cause for high production costs. The Miners' Federation might make a note of the fact that the requirements of Germany for British coal last year diminished by 8 million tons; and most of the principal Continental countries were much smaller buyers. Germany is now a keen competitor in the foreign markets. Can the Miners' Federation do anything to stop Germany from occupying markets in which formerly British coal was bought?

Wembley Gas Exhibit, 1925.

The proposal to repeat, with new features and arrangements, the work done at the British Empire Exhibition last year, has met with a good reception. Secondary products were not so good in 1924 as in 1923, but the spreading applications of our primary product, and the good increases that are being obtained in consumption, convince the administrators of gas undertakings that bold publicity enterprise is the correct thing. Information regarding the scheme for this year was given in our first editorial article last week.

Sulphate of Ammonia.

The quantity of sulphate of ammonia exported in December last was 24,594 tons, compared with 22,689 tons in December, 1923. The total quantity shipped in 1924 was 277,749 tons; in 1923, 253,286 tons—an increase of 24,463 tons. The distribution of the exports last year was as follows: France, 30,855 tons (27,617); Spain and Canaries, 88,974 tons (65,192); Italy, 3463 tons (5208); Dutch East Indies, 35,529 tons (36,628); Japan, 58,980 tons (60,112); British West Indies, 10,582 tons (10,267); other countries, 49,366 tons (48,262). The figures in parentheses are the quantities taken in 1923.

Tar Products Exports.

In December, the quantity of benzole exported was only 6118 gallons, compared with 527,894 gallons in December, 1923. There has been a remarkable decline in the exports of benzole during the past year—over a million gallons less. The total quantity shipped in 1924 was 1,296,358 gallons, compared with 2,308,864 gallons in 1923. The naphtha exported in December was 5310 gallons, as against 85,719 gallons in the same period of 1923. The total exported during the twelve months was 170,417 gallons; compared with 317,393 gallons in 1923. The quantity of tar, oil, creosote, &c., sent abroad in December was 4,921,956 gallons, as against 3,527,015 gallons in the same month of 1923. In the past twelvemonth, 45,322,284 gallons were exported, as against 47,897,669 gallons.

Petroleum Imports—Gas Oil.

There were record imports of petroleum products to this country last year; the total being 1,570,921,087 gallons, compared with 1,325,108,721 gallons in 1923. Gas oil and illuminating oil were the only items that disclosed a decrease. The quantity of gas oil was 67,084,264 gallons, as against 70,746,090 gallons; and of illuminating oil 124,678,042 gallons, as compared with 144,128,501 gallons. The amount of motor spirit was 422,310,541 gallons, as against 327,233,670 gallons. Lubricating oil is responsible for 101,746,917 gallons, as compared with 82,222,696 gallons. The delivery of fuel oil was 385,581,996 gallons, as against 363,738,123 gallons. Crude oil reached 465,184,604 gallons, as compared with 334,617,596 gallons; and other products, 4,334,723 gallons, as against 2,422,045 gallons. Reverting to gas oil, the figures are only about the same as ten years ago, but less than those of more recent years. The value of the 67,084,264 gallons of gas oil last year is returned at £1,197,372; and that of the 70,746,090 in 1923 at £1,085,347. The returned value last year works out to an average of 4·28d. per gallon, and in 1923 to 3·68d.

PERSONAL.

Dr. C. H. LANDER, Director of Fuel Research, has been transferred from the class of Associate Member to that of Member of the Institution of Civil Engineers.

Mr. W. J. M'MILLAN has been appointed Cashier and Chief Collector at the Belfast Gas Office, in succession to the late Mr. J. Lindsay, whose principal assistant he was for some years.

Mining Research Chemistry.

According to information which is given in a comprehensive report just issued by the Executive Board of Mining Research associated with the University of Birmingham, important chemical research work has recently been carried out on: Mining problems and the utilization of fuel; the spontaneous combustion of coal; and matters dealt in by the Deep and Hot Mines Committee. The problems investigated relate to the absorption of gases by coal, the resistance of breathing tubes, the hydrogenation and liquefaction of coal, and certain physiological experiments connected with carbon-monoxide poisoning. The researches on the spontaneous combustion of coal continue to form the chief section of the work of the laboratory, in its application to underground problems. One of the points examined was the liability of fusain (mother of coal) to spontaneous combustion; and the conclusion reached was that, from the chemical point of view, fusain has little to do with the main production of heat during the initial stages of most cases of spontaneous combustion, though from a physical point of view bands of fusain (smut) might possibly be a primary source of trouble in that they supply a channel for the air to reach the more readily oxidizable material.

GAS WORKERS AND THE NATIONAL JOINT INDUSTRIAL COUNCIL.

The Wages Question.

ON Jan. 15, 1924, an agreement was entered into by the National Joint Industrial Council for the Gas Industry whereby an increase of ½d. per hour, *plus* the 12½ p.ct. thereon, was added to the wages of gas workers as from Jan. 1, 1924, and alterations were made in the then existing sliding-scale agreement in favour of the workers. These alterations were to the effect that there should be no decrease in wages until the average cost-of-living figure for a period of three months reached 65. It was also provided that, when the average figure of 79 was reached, the wages of gas workers should be increased by ½d. per hour, *plus* the 12½ p.ct. thereon. It was also further provided that, when the average cost-of-living figure reached 80, the employers' side would be justified in making an application, upon giving one month's notice in writing, to discuss a further increase in wages.

It was subsequently agreed that notice to terminate this agreement could not be given until Dec. 31, 1924, and then only by either side giving three months' notice in writing as from such date.

When the three-monthly average was discussed in December, 1924, the average figure was 79, and a further increase of ½d. per hour, *plus* the 12½ p.ct. thereon, was therefore added to the wages of gas workers as from Jan. 1, 1925.

In the summer of 1924, the workers' representatives on the Council presented a petition asking that the wages of gas workers should be increased, that time-and-a-quarter should be paid for night shift work, and that the national arrangements with regard to holidays in the gas industry should be increased from a holiday of one normal working week to fourteen days' holiday per annum.

At the same time statements appeared in the Press to the effect that the workers' representatives were pressing for 12s. per week increase in wages, time-and-a-quarter for night shift work, and increased holidays.

The workers' representatives admitted that they were bound by the terms of the agreement, and that such agreement could not be terminated until the qualifying period had elapsed.

The employers, after considering the situation, subsequently informed the workers' side of the Council that they were not in a position to make any concession.

This matter was again brought forward by the workers' representatives in the autumn; and they pointed out that they would be compelled to give notice at the end of the year to terminate the agreement unless some concession could be given. The employers, however, stated that they could not vary their previous decision.

Mr. Hayday, the Secretary to the Workers' Side of the National Joint Industrial Council, thereupon gave three months' notice as from the last day of December, 1924, to terminate the agreement.

A Special Meeting of the Central Committee of the Federation of Gas Employers was convened for Dec. 31, 1924, to consider the position; and it was decided that the employers should themselves give notice to terminate the agreement, seeing that its terms were onerous to the employers. The employers further pointed out that they reserved to themselves complete freedom of action as from April 1, 1925.

The decisions of the National Joint Industrial Council for the Gas Industry affect approximately 100,000 gas workers throughout the kingdom.

The National Joint Industrial Council met yesterday afternoon, and discussed the petition put forward by the workers' side. After very long discussion, the employers offered arbitration. The Council adjourned for a week in order to give the operatives an opportunity of consulting their Union.

Importance of Emergency Gas Lighting.

In the course of an article in which he emphasizes the importance of gas in very many situations as an emergency illuminant, owing to the danger that may arise from failure when electricity is the sole source of lighting relied upon, Mr. J. E. Bullard points out, in the "American Gas Journal," that all office buildings should have gas lights in every corridor and on every stairway, and these lights should be burned during the hours of darkness when the building is unoccupied. Hotels should be similarly equipped. Theatres should have gas lights at all exits, and in all passages used for exit purposes in case of emergency. Stores and banks, open after dark, should have a lighting installation in which there is a sufficient number of gas units to make vision clear in case the other lights go out for any reason. Mills and factories not using gas lighting exclusively should have a carefully planned gas equipment, giving sufficient illumination to guide the employees out of the building in case the regular lighting system fails. In other words, in every case where a sudden plunging into darkness would endanger life or property there is a real need for gas lighting.

ELECTRICITY SUPPLY MEMORANDA.

FOR a display of the applications of their only commodity, the electricity supply industry is going to concentrate this year upon the Ideal Home Exhibition. The London Gas Companies and individual firms associated with the gas industry have hitherto made a point of being at the Olympia Exhibition; but the electricity supply industry has only been represented by individual firms with their own specialities on view. The "Electrical Review" has wept over the inadequacy of the display made by electricity and has given vent to emphatic complaint. But it is hopeful that this year there will be no cause for dissatisfaction; for the Electrical Development Association are, our contemporary says, "taking up the matter with as much vigour as that which led to the inspiring display at Wembley last year." We rather fancy it must have depended on the state of mind of the visitor whether or not he or she was inspired by the range of rooms and the rendezvous, which appeared to us—we may have been unlucky in the times of our visits—to be one of the most neglected parts of the Exhibition. However, the preliminary arrangements for electricity being at Olympia are now engaging attention. The space to be taken is to be occupied—if the project matures—by a suite of rooms to illustrate electricity in service; and, among other features, the plan discloses an "emergency exit." Of course, the display will not be so extensive as that at the British Empire Exhibition. Our contemporary thinks that, electrically equipped, the suite of rooms should certainly typify the ideal home. Of course, the really "ideal home" should be run on lines of economy and efficiency; but if the rooms are shown with only electric heating installed, nobody outside an asylum could honestly say that it was "ideal" in respect of economy and efficiency. Not even the hotplate of an electric cooker can boast of those ideal virtues. The Electrical Development Association are to have the active co-operation of the Electric Lamp Manufacturers' Association. They will have good scope for demonstrating what a high standard of electric lighting should be like. It is felt that the success of the section will depend largely upon the treatment of the illumination. Gas has always found at the Ideal Home Exhibition an interested body of visitors; and our electrical friends are of opinion that the electric lighting, heating, cooking, vacuum cleaners, and other motor-driven domestic labour-saving appliances will make a strong appeal. It is believed that the support of the electricity industry is a foregone conclusion. It must not be forgotten that the Ideal Home Exhibition does not draw bulk patronage from all over the country as does the British Empire Exhibition; so that it can hardly be expected that the provincial undertakings will see that there is any good claim to their financial support.

At Olympia.

Overhead Wires.

It is highly interesting to read the views of prominent men in the electricity supply industry as to its prospects. We referred to some of them last week; and others have since been read in the columns of "Electrical Industries." The interest is accentuated by different men looking at the current position and the prospects from varying angles of view. There is Sir James L. Devonshire, K.B.E., who has his eyes on the large areas of electrically undeveloped land in the country. That they are denied a supply is, in the opinion of Sir James, due to the prohibitive cost of laying miles of underground cables through rural districts, and the many difficulties which attend the erection of the more economical overhead lines. The Act of 1919 conferred upon undertakers powers in respect of overhead lines; but in actual practice it is found that to obtain consent to their erection is a slow and cumbersome business, if objections are raised. And objections are being raised more frequently and in a pronounced fashion, owing to the residents in rural areas (who are supposed to be crying out for electricity) inveighing most heartily against the erection of unsightly posts and wires in their picturesque surroundings. It is only right that the residents should have a voice in such a matter; but it looks very much as though Sir James would prefer to have their susceptibilities ground under the heels of the Electricity Commissioners. He thinks this estimable body should have absolute power to give consent to overhead equipment in the case of public highways. This, he believes, would have the effect of hastening negotiations with owners and occupiers of private property. In our opinion, the option should continue with the residents in the rural areas.

Unscientific Lighting.

In regard to electric lighting, too, the public are manifestly inclined to think that they know better than the experts how to use the lamps they purchase. We have Mr. C. W. Sully, Director of the Electric Lamp Manufacturers' Association, saying: "The general public think they know all about light, and that it is the simplest thing to arrange and control. They have the feeling that they are as able as anybody to

arrange their lights, and little realize the damage they can do, the glare they produce, and the waste they cause, by the use of inefficient shades." It must not be forgotten that the supply undertakings are more to blame for this attitude than are the public themselves. Throughout their history, the supply undertakings, so far as lighting goes, have only had one object, and that is to obtain custom. Application did not worry them in the least; and the public were allowed to follow their own devices in this particular. It is what they have grown accustomed to, and it is difficult to eradicate a habit. However, Mr. Sully is of opinion that now "the mistakes are being rapidly exposed; and, before 1925 is out, the country should be purged of much of the inefficient lighting effects that surround us to-day. The whole electrical industry will be immensely benefited by the production of better light, and a universal cry for more light." This can only happen when the supply authorities themselves realize that their policy in the past has been wrong, and set to work deliberately and diligently to rectify it. Continued indifference on their part will not enable the purging to materialize which Mr. Sully hopes for in 1925.

Production and Repair of Appliances.

A strong point is made by Mr. C. H. Wordingham—one of the recognized leaders of the industry—regarding the multiplicity of patterns, especially among household electrical appliances. He thinks these should be reduced, as the present method of production is most inefficient, and therefore costly. His mode of reducing production costs to the advantage of manufacturers, dealers, and users of such appliances is quite sound; but it is questionable whether the manufacturers would consent to it, even in the interests of their own business. What he proposes is that the manufacturers should get together, and settle upon a few patterns of each appliance, and share out the work, so that all appliances of one kind are made by one or two firms only. This would enable manufacture to be carried on in bulk. Not only would costs be reduced, but there should be improvement in quality and design. This prominent expert adds: "There is very great room for such improvement; many of the details of the appliances are crude and unsatisfactory." If we said as much as this, it would simply be swept aside as an issue of deeply-rooted prejudice. Of course, as Mr. Wordingham points out, the manufacture of such agreed designs as a staple product need not interfere with, or fetter, individual firms who thought they could supply the public with something more attractive or better. Then, as now, they would merely have to make these on a small scale, and at a higher cost of production. Another constructive suggestion from the same source is that it would be an immense boon to the consumer, and one which would probably greatly help the sale of electric appliances, if there were some organization with branches in as many towns as possible, which would receive any electric appliance that was out of order, arrange for its repair, and return it to the consumer. Mr. Wordingham believes that at the present time many are held off purchasing because they are satisfied that very soon the thing will go wrong, and then what a nuisance it would be to find out how to get it mended! We think our friend is right. The habit of going wrong is a bad characteristic of electricity appliances; the simplicity of gas appliances obviates this, and the fact is publicly appreciated.

"Raw Light" and "Effective Illumination."

If those dealing with lighting agents would only get the two terms given in this side-heading well into their minds, we should have a little more smartness displayed in the conversion of the former into the latter. Thus it is that we appreciate the article by Mr. W. J. Jones, of the Electric Lamp Manufacturers' Association, which has appeared in the "Electrical Times." "Raw light" is the light given by the electricity (or gas as the case may be) and the lamp without any attempt to modify the direction of the rays in order to gain the most efficient illumiñation for the purpose required. Especially with electric lamps, this has become imperative, in view of the fact that with them greater efficiency in respect of light given to energy used has been obtained by higher temperatures and therefore higher intensities. But what normally happens when the user changes from the older types of lamp to the newest type—in order to secure more light? Mr. Jones says that, when a decision is made to improve the lighting, all that is done is to replace the existing lamps with those of more recent development—taking the carbon or tungsten vacuum lamp out, and placing a gas-filled lamp in the same old shade. In other words, generally, the amount of "raw light" is increased. Tens of thousands of homes and factories have the new lamps in old fittings, or else installed *minus* any reflector whatsoever. The filament of the new lamp is five times as bright as that of the older kind of lamp; and it is therefore little wonder that these powerful sources of light, when incorrectly used, produce glare and irritate the eye. The effect of this is illustrated by Mr. Jones thus—

> How uncomfortable to pass a shop window in which bare lamps are dangling, and how difficult to see clearly the detail of the goods displayed! A bright light in the line of vision makes it more difficult to see clearly and with distinctness, and in the case of the shop window 75 p.ct. of the light is wasted. If the shopkeeper wishes you to see the quality of the goods (unless the goods will not bear close inspection), he must direct all the "raw light" into the window—not letting any escape outwards, and the display will then be receiving twice the previous amount of light, and visibility will be easy and comfortable.

To control the "raw light" is the object of the fittings which screen the bright filaments, and direct the light to the place where it is required. This is a matter for study and appreciation. The more that light which is at present wasted can be directed to useful purpose, the greater will be the economy for the consumer, and the higher the efficiency in service.

Electric Weeks or "At Homes."

We have been reading that the electrical industry, in the opinion of a certain gentleman, hides its light far too much under a bushel. The fact has never been generally observed. It would be a good thing if some of the electric lights which are exposed to view were put under a bushel; there would certainly be less damage to the organs of vision. But, of course, the statement was made metaphorically, and in connection with a proposal of the "Electrician" that local "electric weeks" should be organized. The idea seems to have appealed to Mr. J. W. Beauchamp, the Director of the Electrical Development Association; and he makes certain suggestions. He thinks there should be no difficulty in arranging "electric weeks," given a little closer organization, and more support to central propaganda work than is at present received. He got one in there for his organization. He is of opinion that the electrical industry might obtain a very fine advertisement, and do valuable educational work, by promoting a sort of electrical "At Home" during some particular week of the year—perhaps at the opening of the lighting season. He thinks that if power stations were thrown open to inspection during that period, and the whole movement well advertised, it should be very valuable. All the electrical retail shops could dress their windows suitably and frame their individual advertising towards the same end. Mr. Beauchamp, however, warns the retail shopkeepers that it would not be desirable for them to make a call upon the manufacturers' resources for loan of apparatus or anything of that kind, because simultaneous demands of that sort must be avoided. He also says that he would like to see the proposal associated with the reading of papers of a popular character in different districts, or with some general convention of electricity supply undertakings—a little difficult perhaps because the time of the year when conventions are mostly favoured is not generally the season when most direct electrical business can be picked up. However, Mr. Beauchamp thinks this difficulty is not so acute as in the past, as now the industry is able to offer people labour-saving and cookery devices which "appeal perhaps even more in the summer than in the winter."

The Highest Efficiency.

Electricians are very fond of quoting the best efficiencies that are obtained at the switchboard. This is not surprising, in view of the poor efficiencies that are realized; and therefore the attenuated averages that are secured. But even 21 p.ct. efficiency is not anything of which to boast, as it means a thermal loss of 79 p.ct. But "Meteor" has got almost excited in his notes in the "Electrical Times" regarding some "striking results" which have been obtained at the power house of the Milwaukee Electric Railway and Light Company. Thermal efficiencies depend not only upon the skilful working of plant, but upon the character of the load. The Lakeside generating sets are of the order of 20,000 and 30,000 KW. In October last, 15,795 B.Th.U. were required at the boilers for every KW.-H. delivered at the switchboard, which is an efficiency of 21·6 p.ct., or a loss of thermal energy of 78·4 p.ct. The 21·6 p.ct is a week-in week-out average performance. Lakeside claims to be the most efficient power station in the world. The question is asked: What have Barton (Manchester) and the North Tees stations to say to this?

The Roll of the Institution.—Mr. Herbert C. Higgs, of Basingstoke, and Mr. Arthur G. Lane, of Aylesbury, have been transferred from the class of associate member to that of member of the Institution of Gas Engineers. Gas engineers and those on their staffs wishing to seek election to the Institution are informed that, in order to be in time for the next meeting of the Council, applications, with the required information and signatures, should be received by the Secretary, at No. 28, Grosvenor Gardens, Westminster, not later than Saturday, Feb. 7.

PRESENTATION FROM THE INSTITUTION OF GAS ENGINEERS TO THE INSTITUTION OF ELECTRICAL ENGINEERS.

On Thursday last, at the House of the Institution of Electrical Engineers, Victoria Embankment, before the ordinary business of the evening was proceeded with, there was enacted a scene displaying in a marked manner the *entente cordiale* spirit which is being fostered between the two professions of electrical engineering and gas engineering.

Mr. J. Ferguson Bell, the President, attended with a deputation from the Council of the Institution of Gas Engineers, consisting of Mr. Charles F. Botley (Vice-President), Mr. John Terrace (Member of Council), Mr. W. E. Price (Hon. Secretary), and Mr. Walter Dunn (Secretary), for the purpose of presenting to the Institution of Electrical Engineers an engraved plate to be used in the production of a Presidential Certificate. It is nearly identical in design with that inaugurated last year by the Institution of Gas Engineers for their Presidents. The first impression from it, suitably framed, was handed to Dr. Alexander Russell, President for the year 1923-24. Mr. F. D. Marshall, the designer of the certificate, was present, and was congratulated on the success of his work.

Mr. W. B. WOODHOUSE (President of the Institution of Electrical Engineers), in introducing the matter, said they had with them Mr. J. Ferguson Bell, the President of the Institution of Gas Engineers, with a deputation from his Council, and he would ask him to be good enough to tell the meeting the object of their visit.

Mr. J. FERGUSON BELL thanked them all for their cordial welcome, and said he counted it a great privilege to be present at this meeting of the Institution of Electrical Engineers, because he had attended for the purpose of asking their acceptance of an engraved plate and a framed Presidential Certificate which would be presented to Dr. Alexander Russell, who was President in 1923-24. At the annual meeting of the Institution of Gas Engineers last year, a Presidential Certificate designed by their friend Mr. F. D. Marshall was presented to the retiring President, Mr. Samuel Tagg, in commemoration of his year of office. The certificate was exhibited in these buildings where, by the kindness of the Electrical Engineers, the meetings were held; and it was much praised by those members of the Electrical Institution who happened to see it, along with their much-esteemed Secretary. The Council of the Gas Institution desired to make some tangible acknowledgment of the kindness received from the Institution of Electrical Engineers, not only last year, but also in former years; and it was decided that it should take the form of a Presidential Certificate. The acceptance of this engraved certificate indicated the good feeling that happily existed between the members of both Institutions; and they all hoped this happy feeling of friendliness would long continue. About thirty years ago he was associated with the late Dr. John Hopkinson, who was not only an eminent scientist, but an honoured member of the Electrical Institution. Mr. J. S. Highfield, who was a Past-President of the Institution, was also associated with him at the Stafford Corporation Electricity Works. In those days electricity was in its infancy; it was considered a luxury. But so far back, he believed, as 1890 he advised the Corporation to erect an electricity works. He told the Corporation that he thought electricity had a great future, and that it eventually would become one of the important public utility services. This forecast had been fully justified; and the great advance made by electricity, due to the high technical skill, the enterprise, and the efficiency of the various members of their Institution, was indicated by the enormous use that was now made of electricity for very many purposes. He would like to congratulate the electrical industry upon the well-known scientific men—he might say brilliant scientific men—who were engaged within its ranks. They were supported by well trained, enthusiastic younger men, and by an excellent Technical Press. On behalf of the Institution of Gas Engineers, he wished their Institution continued prosperity. The members of the Institution of Gas Engineers believed there was ample scope for both industries to continue to prosper. It was with the greatest possible pleasure that he asked their acceptance of this Presidential Certificate, along with the engraved plate from which it was a first impression.

Mr. Bell then formally presented to Mr. Woodhouse the certificate, in a heavy English gilt frame. It bore the following words:

> Institution of Electrical Engineers, founded 1871, incorporated by Royal Charter 1921. This is to record that Dr. Alexander Russell, LL.D., F.R.S., held the office of President for the year 1923-24. Witness our hands and seal this 8th day of January, 1925. (Signed) W. B. Woodhouse, President; F. Gill, Member of Council; P. F. Rowell, Secretary.

At the top of the certificate appears a portrait of Faraday, and at the four corners are the words, "Light," "Heat," "Power," "Communications." The Seal of the Institution is placed at the bottom. In general appearance it resembles the certificate of the Institution of Gas Engineers.

Mr. WOODHOUSE, in reply, said he had very great pleasure in accepting, on behalf of the Council of the Institution of Electrical Engineers, this charming certificate, carrying out the very artistic and appropriate design which Mr. F. D. Marshall had been kind enough to prepare. In granting to the Institution of Gas Engineers the use at times of this lecture theatre, they did not expect any such tangible return. He was sure he was voicing the views of all the members in saying that they appreciated very deeply indeed this graceful gesture from the members of a sister Engineering Institution. The members of the Institution of Gas Engineers, like many of the members of the Electrical Institution, were concerned with the proper utilization of coal; and probably the differences of opinion which existed as to what was quite the best way to do it were apt to over-shadow the very numerous and very important interests which they had in common. They were both attempting to solve the same problem. They had very largely worked on independent lines; but those engaged in the supply of electricity to the public were very much indebted to the gas engineers for having first of all made the public aware that they could purchase a means of light, of heat, and of power from a public source, and that they could turn on the tap and get just as much or just as little as they wanted. When electrical engineers came on the scene with another means of light, heat, and power, they had a public which was to some extent educated. He looked forward in the future to a closer approach between all those who were engaged in the utilization of coal. Gas engineers, those engaged in producing coke for metallurgical purposes, those who were mining coal, and electrical engineers, were all closely and very deeply concerned in finding the best possible way to use that coal and to bring to the public the light, heat, and power that they required. The occasion was a very happy augury of future association in discussing such matters. A discussion of their common problems, as well as of their differences, would be all to the good. They were all at one in the object in view, which was to make the best possible use of the national resources of coal in every way. He was very glad to accept, on behalf of the Institution, this kind gift.

Mr. Woodhouse then presented the certificate to Dr. Alexander Russell.

Sunlight and Health.

From the Editors, we have received a copy of the first issue of a new journal bearing the title of "Sunlight," which is published by the Sunlight League, of 37, Russell Square, London, W.C. 1, at 1s. 6d., post free. The first number of this journal, the highly commendable purpose of which is to work for the restoration of the light of the sun to all who live in cities, and to affirm the principles and applications of light to health, contains articles from the pens of such able writers as Sir Oliver Lodge, Dr. Leonard Hill, Dr. C. W. Saleeby, Mr. E. D. Simon and Miss Marion Fitzgerald, and Mrs. Cloudesley Brereton. As Sir Oliver Lodge says, "The vital importance of sunlight to the human race, and to higher kinds of life generally, has never yet been sufficiently emphasized in this country. Most of English history has been made in a fairly clear atmosphere; but in late centuries the extensive use of coal, in an extravagant, wasteful, and uncivilized manner, has been responsible for a serious fouling of the atmosphere, in a way which is unhealthy and must, if it continues, lead to racial degeneration and disease. For when the efficient parts of sunlight are excluded, the organisms which flourish are of the lowest kind; and the higher organisms are apt to succumb to their ravages when unaided by the beneficent influence of sunlight." It is a matter of congratulation that the Sunlight League has been formed to emphasize the importance of sunshine in relation to health, and to encourage the community to give attention to the matter.

Gas in Industry.—Writing in the "Liverpool Post and Mercury," Mr. Edwin Upton, the Treasurer of the Liverpool Gas Company, says that in Merseyside the industrial demand for gas is very large, and also very varied. Gas is extensively employed for such different processes as the superheating of steam, fruit-ripening, the baking of bread and biscuits, jam and sugar boiling, tin canister making, melting of type metal, rivet making, enamelling, forging and bending, and the manufacture of furniture, toys, glass bottles, &c. These examples are chosen at random, but their very differences illustrate what is so peculiarly the merit of gaseous fuel—its suitability for every kind of operation that requires heat. While industry generally is striving to promote thermal efficiency, the Merseyside gas undertakings have spared no effort, and have met with success, in their attempt to supply industrial consumers with a gas constant, within reasonable limits, in calorific value, in composition, and in pressure. The importance of these factors has been fully recognized by the gas engineers responsible.

THE COAL TRADE SITUATION.

[COMMUNICATED.]

ONCE again the unhappy coal industry is being dragged into the full glare of the limelight—a process which it is becoming accustomed to regard as an annual event, but unhappy, nevertheless, because at the present moment it has a serious job of work with which to occupy itself. The agreement which governs the wages payable in the industry in due for renewal or alteration in June, and, in certain quarters, there has been much rattling of sabres and talk of fights to a finish, before even any attempt had been made to examine the situation. And a finish it certainly would be for all concerned, if this attitude was universal. Fortunately a more sober one manifested itself later; and, if the problems are tackled in good time, and in an atmosphere of calm sanity on both sides, there is no reason why the country's hopes of a general trade revival should be blasted so soon by an upheaval in this key industry. But facts must be faced, and there is no doubt that there are enormous difficulties to be surmounted.

THE AGREEMENT.

The much maligned and generally misunderstood agreement is the best system so far devised of dividing the proceeds of the industry on profit-sharing lines. The system has two main difficulties. One is that there are not always any proceeds to divide. The other is that, when there are, it is difficult to convince some people that there should be any question of dividing them at all. The general principle upon which the system is worked is that auditors from two firms representing owners and men examine together, in confidence, the colliery books covering a certain period. There is no actual division of the profits made, but, on certain calculations, the rate of wages for the next period is fixed. The collieries are then worked at these rates, and, according to the profit (or loss) shown under these conditions, the wages for the subsequent period are determined at the next ascertainment. This means that the owners pocket any profit there may be in any period, and the men receive their share in the shape of increased wages in the next period, and *vice versâ*. Of course, there is a minimum rate payable; and when the rate as revealed by the ascertainment falls below this, the deficiency, until wiped out, is spread over subsequent periods to the disadvantage of wages. Such, in brief outline, is the principle of the wages agreement, around which the nation has been promised the spectacle, in the not distant future, of a battle royal—the champions of the one side claiming that they must have considerably increased wages; the other side declaring that, in the present state of the trade, this is quite impossible.

"OWNERS."

There is always apt to be some misunderstanding in the public mind as to the difference between coal owners and colliery owners. Though they may in some instances be the same persons, the coal owner or royalty owner is the man who possesses the coal as it lies in the seam, and who allows the colliery owner to work it, for certain payments, and to market it for his own profit. According to various shades of opinion, either the royalty owner should be allowed to go on possessing the coal, because it is his, or it should be taken away from him, because he neither made it nor put it where it is. Between these extremes, there are various schemes for dealing with him. The essential fact about him is that, on the average for Great Britain, he adds slightly over sixpence a ton to the cost of producing coal.

What, then, are colliery owners? Ogres, bloodsuckers, even murderers, they have been designated. This is not intended to be a defence of them, because, like Emperors, dustmen, and even candle-stick makers, they are human, and doubtless have their faults. But, with them all, being human they realize that they must bow to the inexorable laws of economics, and that the coal trade, with all its national importance, cannot escape their decrees. The last thing in the world they want to do, in spite of what has been said to the contrary, is to depress wages, because, apart from any higher motives which even colliery owners may sometimes have, they are hard-headed men of business enough to realize that high wages mean contentment, and contentment leads to prosperity. What they do want is a lowering of the cost of production; and this they must have if the industry is to stand on its own legs. Moreover, the nation may be said to have given a fairly clear indication at the last general election that this is what they expect industry to do. Whether this is to be achieved by a return to the eight-hour day is arguable. Even the owners themselves are not entirely agreed upon the advisability of pressing for it. At any rate, with production per man per shift at the present average rate for Great Britain at just over 17 cwt., as against over a ton in pre-war days, Germany and the United States of America can put coal into what we used to consider our markets at prices with which we cannot possibly compete. This is not arguable, but is a fact of which collieries and exporters can daily quote specific instances. This is with wages at a minimum rate—a rate which the owners would be among the first to acknowledge is already too low both in relation to the cost of living and in comparison with wages in other so-called sheltered industries.

ABOUT "PUTTING-UP THE PRICE."

Whenever the coal trade is depressed, and the wage question is raised, there is always a good deal said about putting up the price of coal. Now, up to the present, the supply of coal at home is a monopoly of home producers; and, if, as a whole, they be regarded as a ring or combine, presumably they can make the price of coal what they like. Did ever any industry flourish by such methods?

But there are two serious arguments against such a procedure: In the first place, the reasonable and oft-reiterated outcry, in which the socialist party has specialized, against rings and monopolies in general. Secondly, there is the struggle with which our other great coal-consuming industries are faced, and their vital need of the cheapest fuel possible, in order to be able to hold their own in the world markets, and support the millions who are dependent upon them. Apart, however, from these considerations, Great Britain, under the very best trade conditions, cannot use by any means sufficient coal to keep all her mines and miners in employment, and she has always regarded her coal exports as paying for a considerable quantity of necessary imports. Can we "put up the price" to the foreigner in open competition in the world market? It would take all the king's horses and all the king's men to make the Italians buy English coal in preference to American coal of equal value at a lower price, or the Dutch with German coal at shillings a ton less. This is where it is vain for even the coal trade to kick against the pricks.

POSSIBILITIES.

The great question facing the industry now is what is to be done, and done quickly; for, if there is one thing which, above all, militates against prosperous conditions, it is the possibility of a serious stoppage in the coming summer. While, nearer the time, consumers' demands for stocking purposes generally cause a temporary increase in demand, the uncertainty of the position discourages would-be buyers from contracting ahead. It is upon good steady working that the industry thrives best. Stocking facilities are negligible; and every day that a pit lies idle, the overhead charges, pumping costs, and so on, have to be added to the cost of producing coal another day. There is no gainsaying the fact that one solution of the difficulties would be a reduction in producing costs; but, since labour charges form more than 70 p.ct. of these, and, since it is agreed that the miners' earnings are already too low, are they willing first to try to produce more coal for the same money? If the ton of coal cost less, improved trading would quickly be reflected in wage rates, even under the existing agreement. Human nature being what it is, the effect of giving more money first generally has the reverse effect upon output. That is the first and most obvious suggestion for solving the problem, and naturally it implies an obligation on the owners to do what they can to reduce the three-sevenths of the costs which are not due to labour charges.

The output suggestion being the owners' chief contribution to the controversy, it is up to the men to make proposals as to what can be saved on the other three-sevenths. It is obvious, however, that these are not likely to be able to bear the whole of the two shillings by which British exporters are at present losing a good many orders. Can the railway companies help by reductions in rates? The coal trade is constantly urging them to try, but their own people are even now pressing for more wages. Can the shipping companies do anything? They still maintain they have boats laid up because they cannot be made to pay at present freights.

It is not proposed in this article to discuss the remedy which the Miners' Federation are convinced would cure all ills. Nationalization is a wide subject, and in any case the nation, for better or for worse, has decided for the present that it will have none of it. Whether, trading in a speculative industry, the nation could put up a better fight against economic conditions and foreign competition is decidedly debatable. Whether the miners themselves, who would no doubt be quite willing to manage the mines for the nation, could make a better job of it than the present owners, is equally debatable. Certain it is that both parties know a very great deal about coal mines and mining conditions—a great deal more than all the politicians in the country. If they cannot get together and evolve something between them, then prospects are black indeed for the coal trade, and for industry in general. But facts must be recognized as facts; and it is no use pretending that the colliery owner is purely and simply a philanthropist, that the man-shift in the pits could not possibly produce another hundredweight, or that German and American competition is not becoming more and more keen. One thing that certainly will do no one any good, least of all the poor British public, is all this talk about fights for existence, and obviously impossible demands on a sick industry. It is common sense that is required to deal with an admittedly difficult situation, and not imported nonsense.

* * *

"Do you believe in God?" asked the ardent young Socialist miner of the speaker at a political meeting.

"Of course I do" was the natural reply.

"Man you *cannot*, you're a coal owner."

This is an illustration from life of one of the great difficulties of the working of the much harassed mining industry.

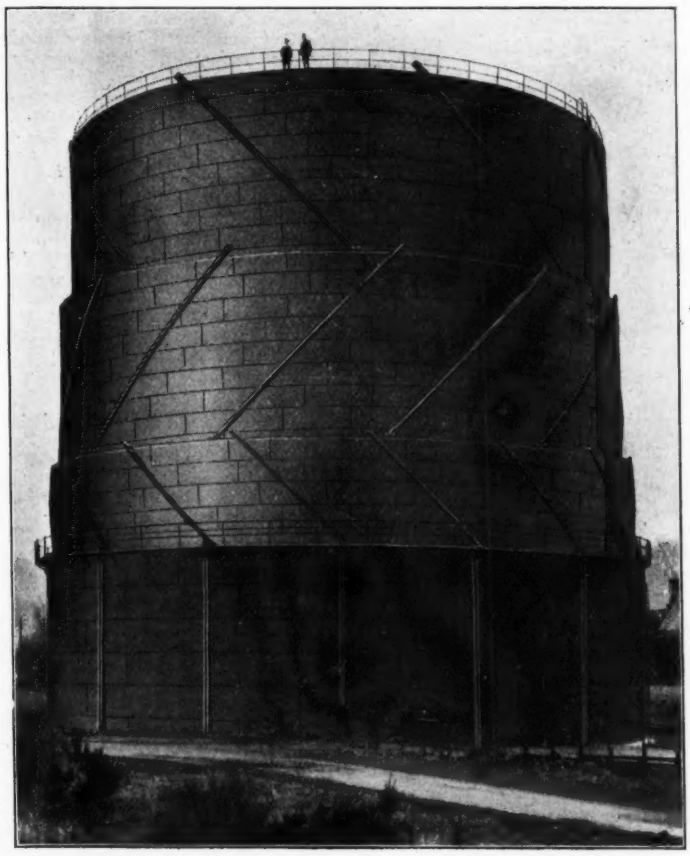
A THREE-LIFT SPIRAL-GUIDED HOLDER AT GALASHIELS.

AN interesting function took place on Tuesday, Jan. 20, at Galashiels, when there was formally inaugurated a new three-lift spiral-guided gasholder which Messrs. Robert Dempster & Sons, Ltd., of Elland, have completed for the Gas Company. There was present a representative company of gas engineers and others connected with the gas industry.

The visitors were met at the gas-works and welcomed by Mr. George Hunter, Chairman of the Galashiels Gas Light Company, Mr. A. Dow, the Engineer of the Company, and Mr. J. W. Broadhead, Managing Director of Messrs. Robert Dempster & Sons, Ltd.

The early forenoon was spent in an inspection of the works, including a Dempster-Toogood vertical retort installation which is giving great satisfaction. Later the Company gathered around the gasholder, where Mr. J. W. Broadhead, who was accompanied by his son, the patentee, explained the features of the "Elland" patent ball carriages.

At noon the chief ceremony of the day was performed, when Mr. HUNTER turned on the gas from the holder to the town. Mr. BROADHEAD said that the holder at Galashiels was the fifth of seven of the type to be completed by his firm, one of which



was under construction at Victoria, British Columbia. So far as the Galashiels holder was concerned, they had experienced bad weather during the constructional period, and after the work had been finished; but the contract had been completed within the specified time. He had now a very pleasant duty to perform—to ask the Chairman of the Galashiels Company to accept from the contractors a rose-bowl, as a memento of the inauguration of the new holder. The gift bore the following inscription: "Presented to the Chairman of the Galashiels Gas Light Company—George Hunter, Esq.—on the occasion of the opening of the new gasholder. Jan. 20, 1925."

Mr. HUNTER, in acknowledging the gift, expressed his gratification at seeing so many present to inspect the new gasholder, and witness its formal inauguration. The Galashiels Company were thoroughly satisfied with the work. The situation of the works was very exposed, and they suffered from the effects of gales. Only a week ago the holder had withstood without the slightest oscillation one of the severest gales that the district had ever experienced, during which the holder was fully inflated, the top being about 100 ft. above ground level. He was very pleased to have this memento of the occasion of the holder's inauguration, and he would always value it highly.

LUNCHEON.

Following the formal ceremony, there was a luncheon at the Douglas Hotel. At this Mr. Broadhead presided. After the Loyal Toast,

Mr. A. L. BROWN gave the toast of "The Galashiels Gas Company. He referred to the determined spirit of the Chairman, under whose guidance the Company were bound to prosper.

Mr. HUNTER, replying, briefly traced the history of the Company from its formation in 1853. At first the works were situated in the centre of the town, but in 1866 the old gas-works were removed to Galafoot. He had no hesitation in describing this site as a good—indeed, an ideal—one. The aim of the Company was to supply an ample and good supply of gas at the lowest possible price; and nothing would be left undone to further this aim.

Mr. P. M'LEAN proposed the toast of

"THE CONTRACTORS."

Mr. BROADHEAD, replying, said he wished to thank Mr. Dow for the arrangements he had made for the ceremony. This was not the first contract that his firm had carried out for the Galashiels Gas Light Company. In the days of the late Mr. Scott, he believed, the firm remodelled the retort bench. Since Mr. Dow had been Manager, horizontal retorts had been built, and later Dempster-Toogood verticals had been erected. For a small plant, he ventured to say that it was second to none in Scotland; and he had been pleased to hear from Mr. Dow an expression of praise as to its working. In spite of trade depression, while the make of gas in 1917 was 76 million c.ft., it now totalled 100 millions. This spoke volumes for the enterprise of the Company and their efficient Manager. He desired to thank Mr. Dow for his assistance during the course of erection of the holder.

Thereafter "The Town and Trade of Galashiels" was proposed by Mr. J. D. KEILLOR, of Hawick, and acknowledged by Councillor J. HAYWARD, of Galashiels. Mr. J. W. M'LUSKY, of Glasgow, proposed "The Engineer of the Galashiels Gas Company;" and Mr. Dow replied.

The "Elland" Patent Ball Carriage System.

The new holder which has been erected at Galashiels by Messrs. Robert Dempster & Sons, Ltd., of Rose Mount Iron-Works, Elland, is a three-lift one in a steel tank 96 ft.

diameter by 28 ft. deep. The holder is of a capacity of 500,000 c.ft., and the pressures thrown are: Inner lift, 45-10ths; two lifts, 72-10ths; and three lifts, 97-10ths.

The guiding of the holder is on the entirely new system which has already been fully described in the "JOURNAL"—namely, the "Elland" patent ball carriage system, in which, instead of the rails of the holder passing through one or two pairs of flanged rollers for guiding purposes, each rail passes between two pairs (*i.e.*, four in all) of hard steel balls 2 in. in diameter, which are free to revolve in various directions, so that the balls are not subject to wear on any particular portion of their surface. Each ball will stand a crushing strain of 175 tons, and the whole of the carriage is made of mild steel drop forgings. The rails themselves are of double the weight and more than double the strength of the rails used on other spiral guided holders, and thus very strongly connect together the curbs and cups and vertical stays, making a very strong framing for the holder side sheets. They have double recesses throughout their length, in one of which the balls work, while down the other any water collecting on the crown or overflowing from the dips can run into the cups below, and thence to the tank. With this carriage there are no sliding axles.

The first holder with this type of ball carriage was put up last year, but already there are seven erected or in course of erection on this system, showing that the principle is gaining great favour. Engineers who have seen the working of these holders during the recent hurricanes have expressed themselves thoroughly satisfied with their absolute steadiness.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

A meeting of the Association took place at Cardiff last Saturday week; the chair being occupied by Mr. B. J. BELL (the President), who was supported by Messrs. H. D. Madden, D. Muir, and C. S. Bateman.

PROMOTION.

The PRESIDENT, at the outset, referred to the fact that the first President of the Association, Mr. T. B. Armitage, of Swansea, had been successful in obtaining the position of Distribution Engineer to the Cheltenham Gas Company. He extended to Mr. Armitage their heartiest congratulations; they were more than pleased that their Association had provided yet another man to take his place in the forefront of the industry. Mr. Armitage had rendered them invaluable service, and he moved that a vote be recorded conveying to him their heartiest good wishes in his new sphere.

Mr. T. A. CANNING (Newport) referred to Mr. Armitage's efforts to propagate the advance of the Association in the western area of their district, and said it afforded him great pleasure to second the vote expressing their thanks for that work and their felicitations and good wishes for the future.

Mr. ARMITAGE returned thanks, and expressed the hope that he might occasionally be permitted at future meetings to renew acquaintance with his many friends.

The following paper, which was accompanied by a series of lantern slides, was then read:

MECHANICAL AIDS TO GAS MANUFACTURE.

By R. W. FOSTER, of Cardiff.

This is a subject of such interest and dimensions as to make it difficult to confine it within the limits of a short discourse. It is within the scope of the paper not to deal with the actual processes of gas manufacture, but to demonstrate how the manual labour formerly involved has gradually been replaced by mechanical devices. That this is a scientific and mechanical era proves true in the gas world as in other spheres.

The early types of retorts depended entirely on manual labour, and during the nineteenth century gas engineers had to seek mechanical assistance to enable them to cope with growing needs and larger quantities. Chief among pioneers in this direction was Samuel Clegg, who designed gas apparatus for many large establishments in the country. He invented the hydraulic main, the lime purifier, and the wet meter. Gas lighting and heating have proved among the greatest boons of the age, and no industry has shown such progression and success. The progress made in the machinery for gas manufacture is very striking.

The first retorts were made of iron, and were fixed in a vertical position in the furnace; but the difficulty of withdrawing the coke made an alteration in the position vitally necessary. So the retorts were laid first at an inclination, then horizontally, and the coke drawn by hand. Of late years the fixing of retorts in a vertical position has returned to favour, early difficulties in extracting coke having been overcome.

At the present day, labour-saving machinery is used on gas-works for the following purposes:

1.—Tipping of coal wagons.
2.—Charging and discharging of retorts.
3.—Conveyance of coal from point of delivery to point of consumption.
4.—Breaking-up of coal and coke to the required size.
5.—Conveyance of coke from the retort house to a suitable storage place, or to other machinery for grading, screening, or washing.
6.—Producer poking and clinkering.
7.—Disintegrators for oxide, conveyors for sulphate of ammonia, and oxide.

Slides demonstrated the stages of progression from the crude and unwieldy to the efficient present-day contrivances. In early times coal wagons were unloaded by hand at the rate of three wagons a day each man. Hydraulic, belt-driven, or electrically operated wagon tippers are now employed to do the work. One of the latest wagon tippers is arranged on a sliding steel cradle, to take the wagon completely off the rails, and get a 20-ton wagon in such a position as enables it to empty itself. Another type is the rotary wagon tipper, which empties a wagon by a circular motion.

The coal, having been tipped, passes through breaking processes to reduce it to a minimum and more uniform size, and thus facilitate charging. With one type of coal breaking plant, the coal is elevated into the overhead hopper and fed, by means of a reciprocating feeder, into a jigging screen, which allows all small coal up to 3 in. cubes to by-pass into the hopper below, and only the large lumps pass through the breaker.

When the industry was in its infancy, the operations of charging and discharging were done by hand; but the application of machinery in gas manufacture is now advancing towards perfection, thanks chiefly to the ingenuity and indefatigable concentration of the late Mr. John West, who devised machinery for stoking, and improved his hand and power charging and drawing machines. A patent was granted to Mr. John West in 1873 for a charging and discharging machine, and the framework of his experimental machine was constructed from an old wooden bedstead. In 1874 he improved his charging machine.

[Illustrtions wre then thrown on the screen of West, Briggs-Wall, Drakes, Jenkins-De Brouwer, Fiddes-Aldridge, Gibson-Nicol, Herbert Morris, &c., stoking machinery and coal and coke handling plant; and also a cross section of a Glover-West vertical retort house.]

The gasholder has gone through a period of reformation. The earliest practical holder was of the counter-balance type; this, of course, being necessary before the exhauster came into use. The invention of the exhauster, however, immediately altered the principle of the counter-balance holder, which created a vacuum on the whole of the plant sufficient for operating conditions on the works. The latest type of holder is the spirally-guided pattern, which of recent years has been subjected to considerable alteration in design and mechanical improvement, costs thereby being reduced.

Mechanical aids introduced in gas-works are generally used in connection with the retort house only. In the larger works, however, bye-products, such as sulphate of ammonia, can be profitably handled by machinery. Also substances like ashes, breeze, and oxide of iron can be conveyed mechanically, thus economizing both time and labour. Any application which can prove a saving justifies the installation of mechanical aids.

Mr. MADDEN, welcoming the Association, said the Directors of the Cardiff Gas Light and Coke Company had always taken the keenest interest in their work. He congratulated Mr. Foster upon his admirable paper.

Mr. T. A. CANNING, proposing a hearty vote of thanks to Mr. Foster, said the application of machinery in gas-works had resulted in considerable saving to the industry and to the public in the reduced price of gas thereby effected.

Mr. C. S. BATEMAN, who seconded, thought they would all agree that Mr. Foster had enabled them to spend a most instructive evening. The advance achieved might be illustrated by the fact that the Gas Light and Coke Company were incorporated in 1812 with a capital of £200,000. To-day the capital of that Company stood at some £30,000,000. Without the aid of mechanical devices, the great advance shown by the industry would not have been possible.

Mr. D. MUIR, supporting, referred to the types of machinery now in vogue on the purely distribution side of the business, which enabled gas to be distributed at higher pressures.

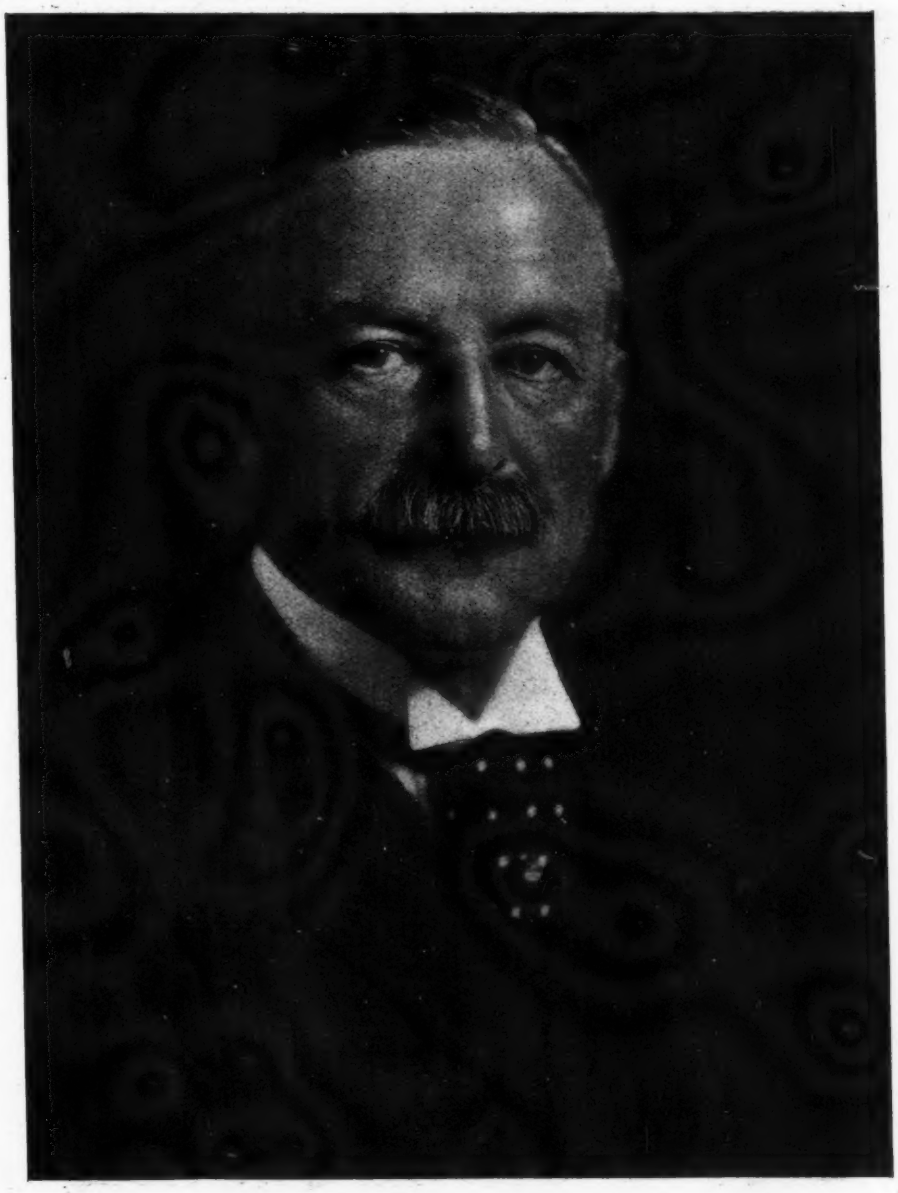
After discussion of the paper—the speakers including Messrs. C. B. Felton (Newport), T. A. Canning (Newport), D. M. John (Aberdare), H. D. Madden, A. W. Thain (Newport), Collins (Swansea), and Williams (Abertillery)—the vote of thanks to the author was carried with acclamation, and acknowledged.

Boiler Firing by Pulverized Fuel.—In this month's issue of "Combustion," Mr. Louis D. Ponzio discusses at some length the relative merits of the indirect system and the unit system of pulverized-fuel firing for steam raising. The chief advantage of the unit system is that it is cheaper for small power plants. The indirect system, however, shows a lower cost of maintenance, can be operated for short periods and still maintain the boiler plant load for 24 hours, and has a greater over-all efficiency. It is generally advisable, suggests Mr. Ponzio, to use the indirect system in large central stations.

CENTENARY OF THE BRITISH GAS LIGHT COMPANY, LTD.

A Short History of the Undertaking.

As one means of celebrating their centenary—others were chronicled during the time of the Wembley Exhibition—the British Gas Light Company, Ltd., have compiled a beautiful book replete with interest and rich in illustration. Under the title of "A Short History of the Company," there are a mass of facts and a host of portraits which will be valued by everyone who is in any way connected with the Company. There are portrayed all the Chairmen—Mr. Jacob George Wrench (1825-1841), Mr. John Wilkin (1841-1875), Mr. Philip Twells, M.P. (1875-1879), Mr. Henry Wood (1879-1890), Mr. John Horsley Palmer (1890-1914), Sir Corbet Woodall (1914-1916), Sir Robert S. Gardiner (1916-1919), and Mr. Henry Woodall, M.Inst.C.E. (elected in 1919)—and the present Directors, Mr. Harold G. Palmer (Deputy Chairman), Mr. Frederick Wilkin, Major-General W. T. Corrie, Mr. L. R. Abbey-Williams, and Mr. Henry Pullman, J.P. Then come the Secretary (Mr. A. W. Brookes, who entered the Company's service on May 22, 1878, and was appointed to his present position on Jan. 1, 1908), and the well-known Engineering Staff—Mr. Thomas Glover, C.B.E., M.Inst.C.E., Mr. Harold E. Copp, M.Inst.C.E., Mr. C. Rhodes Armitage, Mr. E. A. Sainsbury, and Mr. A. T. Howard. We rejoice to find the photograph of Mr. John Young, who was successively Engineer and Manager of the Company's Staffordshire Potteries, Norwich, and Hull undertakings, and retired in 1919. We are indebted to the Company for the loan of the blocks used in the following pages, and take this opportunity of congratulating them on their production.



HENRY WOODALL, M.INST.C.E.
Chairman and Managing Director.

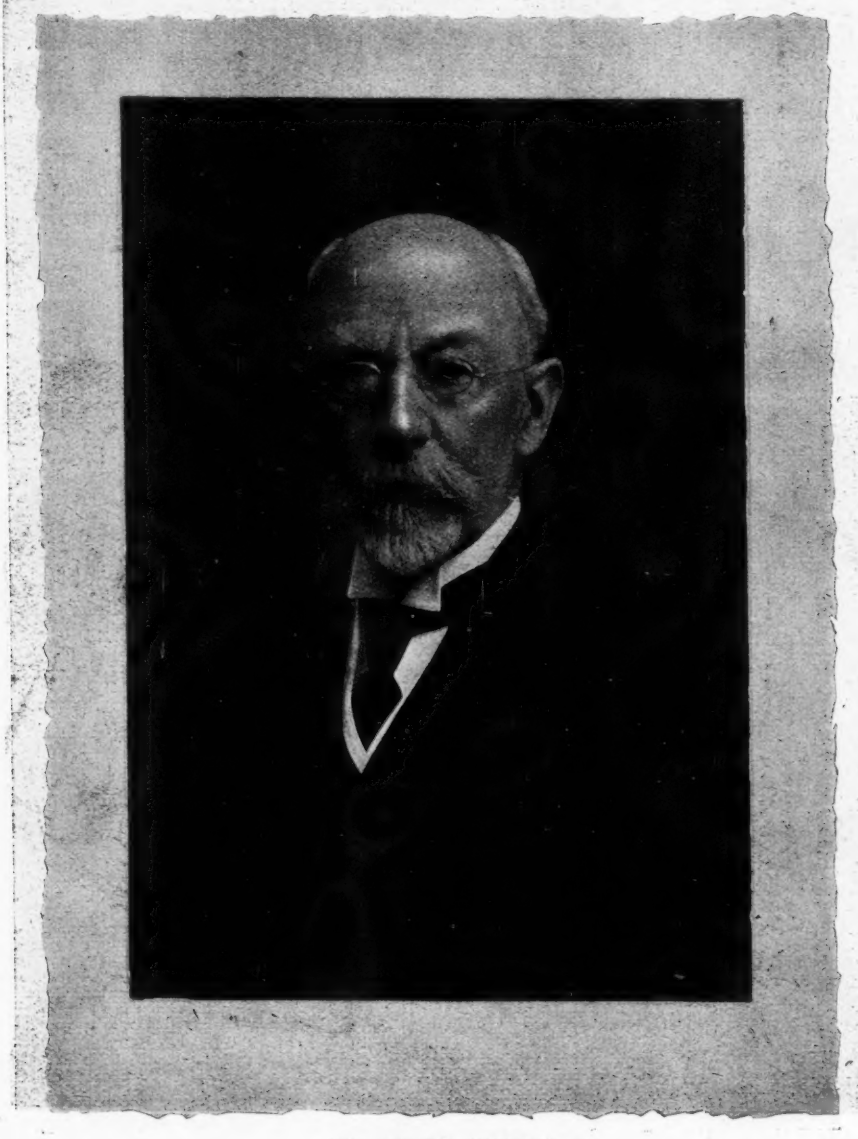
The first meeting was held on March 8, 1824, "for the purpose of taking into consideration the establishment of a new Gas Company," and it was resolved that the British Gas Light Company be formed to contract with, and supply light to, towns or places that might require gas.

NORWICH.

Within a year of inauguration, the British Gas Light Company's activities had come to be largely bound up with the life of two provincial centres—the ancient and beautiful cathedral city of Norwich and the equally ancient river-port of Hull. Norwich had already experienced to some extent the homely convenience of gas lighting when the emissaries of the British Gas Light Company arrived in the city. Among its illustrious sons, Norwich boasted one John Taylor, an inventor, who in 1815 obtained a patent for apparatus to assist in the decomposition of certain animal substances, including oil, from which he had discovered that he could procure a kind of gas, apparently useful as an illuminant. Taylor and his partner, Martineau, exhibited their patent oil-gas apparatus at the Apothecaries' Hall in 1819, and during the following year they formed the Norwich Gas Company, and succeeded in obtaining parliamentary authority for the construction of gas-works and laying of pipes for the public supply. For a brief while oil gas seriously competed with coal gas. Hull, Bristol, Leeds, Colchester, Leith, Bow, and Whitby all adopted it for lighting purposes, during the next few years, and actually a company applied for parliamentary power to light with oil gas the "City of London and the Liberty of Westminster," declaring its capital at £900,000.

This attempt to capture the country for oil gas was by no means without creditable support. The most scientific and impartial chemists and engineers in Great Britain gave divided testimony respecting the different values of coal gas and oil gas. However, after the expenditure of large sums of money on it, the oil-gas Bill for the "City of London and the Liberty of Westminster" was thrown out of Parliament, and coal gas gradually re-established in favour. On the other hand, Taylor's Parliamentary Bill for Norwich met with success. A brief success, though; yet it lasted long enough to give Taylor the satisfaction of knowing that in his native city an oil-gas works was built upon a scale that would allow for lighting streets and public buildings. It was in December, 1824, that the Directors of the British Gas Light Company first considered the advisability of acquiring this oil-gas concern at Norwich, which was carried on by a Company called the Norwich Gas Light Company under Act of Parliament dated 1820. In March, 1825, the Directors of the British Gas Light Company authorized one of their colleagues to proceed to Norwich to complete an agreement for the purchase of all the shares held by the proprietors of the Norwich Company. It was also arranged that a further £600 should be paid to the proprietors "for the stocks in hand when the works were handed over."

An amended Act for lighting the city was thereupon promoted, and the Royal Assent given in May, 1826. Four years afterwards, in March, 1830, the Company decided to convert the works from an oil to a coal gas establishment, and to supply gas from coal throughout Norwich. Thus ended the short reign of oil gas in that city, and the enduring reign of coal gas began. More land was purchased, and new plant erected—a timely action, for it enabled the Company to conclude an agreement with the Commissioners for lighting 420 public lamps. A short delay arose owing to defects in the gasholder tanks; but on Nov. 22 of the same year (1830) coal gas was definitely supplied for public lighting and to consumers on the



SIR CORBET WOODALL.

Chairman 1914-1916.

principal streets. The Chairman stated in September, 1831, that the Norwich Works had become the most valuable and important of the Company's stations, the capital expended on it amounting to about £30,000. Business increased, and a reduction in the price of gas from 13s. to 10s. per 1000 c.ft. was made on Lady Day, 1836. The existing mains and manufacturing plant were enlarged and extended, and in 1839 a new gasholder was erected.

The Company were now able to co-operate with the authorities for lighting the suburbs of Norwich as well as the centre of the city—though within a moderate range at first—and a few lights were introduced into the Bishop's Palace, the Company anticipating from this the more general adoption of gas in private houses. The Company were able to announce another decrease in the price of gas at Norwich from 10s. to 9s. per 1000 c.ft. from January, 1843. As time went on, and developments progressed, further reductions were made, successively to 8s., 6s. 8d., 5s. 10d., 5s. 6d., and on New Year's day in 1851 the price became 5s.

The time had now arrived when the existing works, which were situated at Bishop Bridge, required to be extended. But there was no room on the site for any sort of enlargement, so that the Directors had to purchase land elsewhere. They found an eligible site at St. Martin-at-Palace, where they erected new works, and gas was first supplied through this channel on Dec. 22, 1851, though the works were not completed until 1853. In 1857 it was decided to promote a Bill, which received the Royal Assent on July 12, 1858. Under this Act the Norwich Gas Light Company was dissolved, and the Acts relating to it were repealed. The local authority became entitled to appoint their own Auditor, and the Company had to keep a separate set of books showing full details of the working of the Norwich Station. This method has been continued to the present day, the accounts being verified and signed annually by the Norwich Corporation's Auditor as well as by the Company's two Auditors.

The extensions that were carried out as a consequence of this new Act involved such an expenditure of money that by the year 1874 the authorized capital was exhausted. Another Bill was therefore promoted to empower the Company to enlarge their works and expend further capital at Norwich, and the Act received the Royal Assent on May 13, 1875. In 1867 the Directors had succeeded after prolonged effort in inducing the Great Eastern Railway to take their gas supply in Norwich from the Company instead of manufacturing it themselves. The epoch-making system of letting out on hire gas cooking and gas heating stoves was introduced throughout the city and suburbs in 1882. In 1897 a carburetted water gas plant was installed at the Palace Station. As further extensions became necessary, the Company applied for parliamentary sanction, and Acts were passed in 1896, 1903, and 1918, and an Order obtained in 1923 authorizing further capital expenditure. Under the 1918 Act the Company's limits of supply were extended.

Mr. Thomas Glover was appointed Engineer and Manager of the Norwich undertaking on Oct. 1, 1901. During September of the following year he submitted a scheme to convert the works at Bishop Bridge into a distributing station, and thus concentrate on the manufacture of the gas at St. Martin-at-Palace. His scheme was approved, and the alterations were commenced in 1903, and completed two years later. Since that time the gas has been conveyed from the Palace Station to Bishop Bridge, half-a-mile distant, and there purified, stored, and subsequently distributed. The successful carrying-out of the necessarily complicated alterations while still maintaining the supply of gas to the city was an achievement of which any gas engineer might be proud.

SIR ROBERT S. GARDINER.

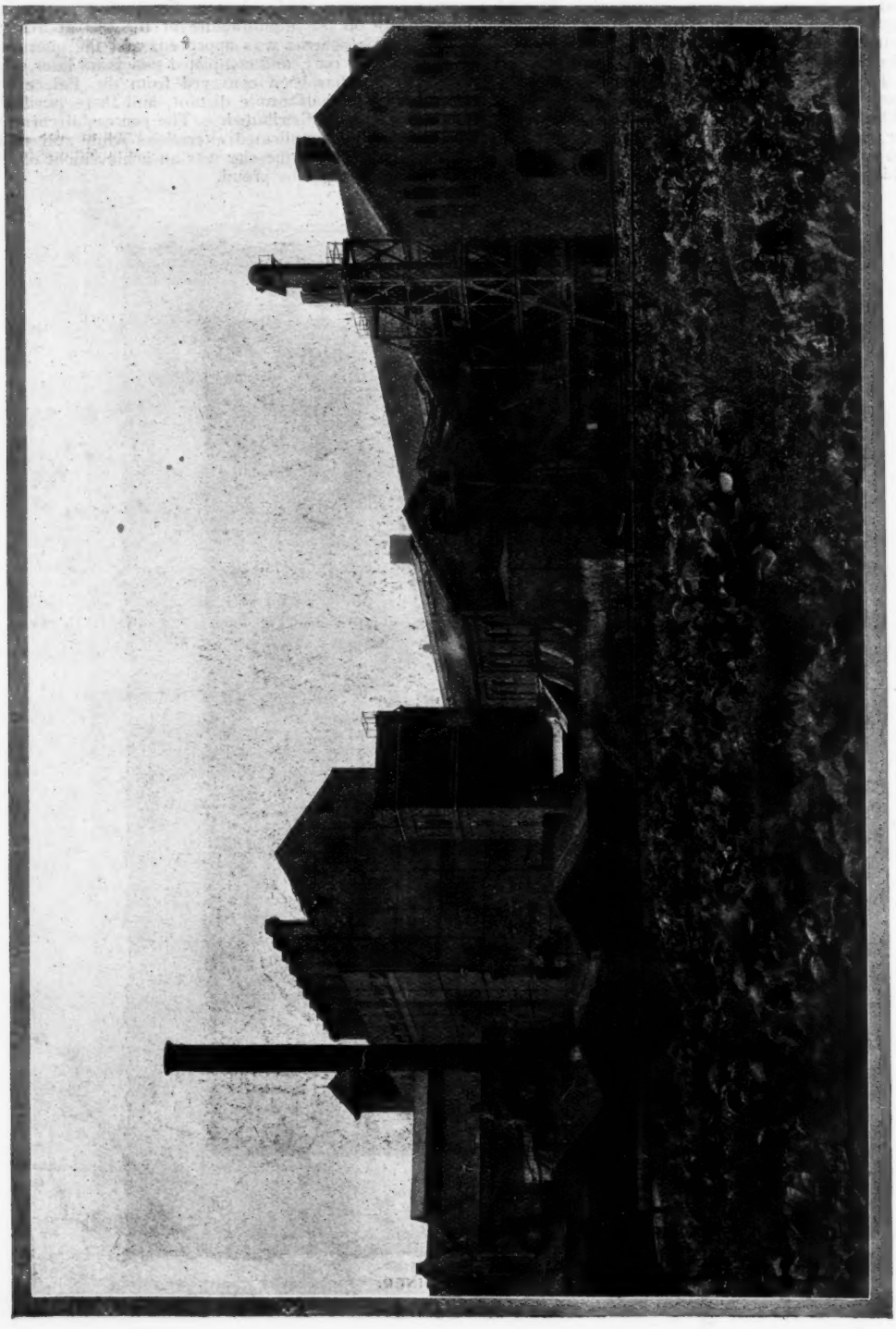
Chairman 1916-1919.

The quantity of gas which was sold at Norwich in 1923 was 748 million c.ft. In 1905 the sales amounted to 437 million c.ft. This large increase within eighteen years necessitated further additions of importance to the manufacturing and distributing plants. Watchful for any opportunity that might arise, the Directors have purchased whatever land adjoining the St. Martin-at-Palace Works has come into the market, however small the parcel. Although several purchases were made, the plots were so small that the total addition to the site only measures about 1¼ acres. The new land was scheduled for gas-works purposes in the Company's Special Act of 1918, and has proved adequate to enable the Directors to enlarge to a considerable extent the manufacturing plant, which should now be equal to the needs of the station for many years to come. The extension was carried out by Mr. Glover between the years 1920 and 1922, at a cost of £236,000. The manufacturing plant now consists of the following:

	Nominal Capacity per Diem.
Horizontal retort house	2,400,000 c.ft.
Vertical retort house (Glover-West)	2,600,000 ,,
Carburetted water gas plant (Humphreys & Glasgow)	3,500,000 ,,

The Company's engineers at Norwich have at times been faced with exceptional difficulties, but the history of the station shows that they have always proved equal to the situation. The most striking instances of this occurred in 1878 and 1912, when the city was inundated by floods which brought distress to the locality and occasioned much damage. As a consequence of the first of these inundations, the St. Martin-at-Palace Works were under water for forty-eight hours, but the city was kept supplied with gas notwithstanding. Again, when the works were flooded in 1912, and considerable dislocation was caused to the other public services of the city, the Company were able to record that the supply of gas had been maintained. It is pleasant to be able to say that the Town Clerk of Norwich sent a letter on behalf of the Corporation thanking the Company for the work their Manager and staff had done for the city.

Before leaving Norwich it should be recorded that three officials at this station completed fifty or more years' service. Mr. C. G. Frost (Chief Clerk) retired on May 31, 1914, after having been 52½ years with the Company; Mr. H. P. Oakley and Mr. A. Cracknell (Collectors) both retired on July 31, 1919, the former having served 56½ years and the latter 50 years. All received retiring allowances, and presentations were made in each case by the Company and by the Norwich staff.



NORWICH STATION.
General view of the St. Martin-at-Palace Works.

CHEMICAL WORKS AT GREAT YARMOUTH

The Norwich Station is not so self-contained as are the Company's other works, for the manufacture of sulphate of ammonia and the distillation of tar are carried on elsewhere. When it was decided by the Company to deal with the Norwich residual products elsewhere, land was purchased some 20 miles away—at Great Yarmouth—and works were erected there for the purpose, and operations commenced in May, 1884.

The raw products are conveyed from Norwich to Yarmouth by river. Freightage, however, is a serious item, and at times, when markets have been depressed, it has proved more profitable to close the works temporarily and dispose of the products direct from Norwich. Still, the works have been in continuous use during the past twenty years, and a useful addition was made to them during the war, when a rectification plant was installed for the purpose of supplying refined spirit required by the Government.

HULL.

The closing weeks of 1824 were especially momentous in the history of the Company; for, while the Directors were considering the advisability of acquiring the existing oil gas concern in Norwich, they authorized the purchase of another oil gas concern at Hull. The Secretary was instructed to carry the transaction through "on the best terms he could or to purchase as many shares as could be obtained at any price under par." This referred to the Kingston-upon-Hull Gas Light Company. The British Gas Light Company, however, were only successful in acquiring a few shares in it. In 1825, the Directors of the British Gas Light Company erected coal-gas works at Sculcoates, on the banks of the river. Repeated attempts were made by the Directors either to rent or to purchase the Kingston-upon-Hull undertaking, or, failing this, the Secretary was instructed to proceed to Hull for the purpose of treating for the sale of the works or letting them on the best terms he could. It was also suggested that the two concerns should be united. But none of these schemes matured.

By 1829 coal gas was in great demand. Unfortunately, at that time, however, the Company were unable to obtain the authorities' permission to lay down mains, despite a memorial addressed to the Hull Corporation by would-be consumers. The Directors therefore resumed their attempts at negotiation with the Kingston Company. Once again the proposals found no response. Then came a significant happening—on Dec. 10, 1829, the town was reported to be in darkness due to defective supply by the Oil Gas Company. The works, too, had become

HULL STATION—SCULCOATES.
From the air.

a nuisance to the neighbourhood, and in 1830 the Kingston Company altered them and installed a coal gas plant. Soon afterwards the British Gas Light Company found themselves in competition with the Kingston-upon-Hull Company for the lighting of the Dock Company's district; but the British Company were successful in obtaining the contract.

The growth of the Company's business at Hull reached a stage where, in order to cope with the increased demand for gas, it was found necessary to erect additional plant. A new tank and gasholder, purifiers, and other equipment were installed in 1846. As a consequence of repeated reductions made by the Company in the price of gas, the number of customers greatly increased.

In 1846 a third Gas Company had been established at Hull—the Sutton, Southcoates, and Drypool Gas Light Company—for the purpose of supplying with gas the parish of Sutton, the township of Southcoates, and the parish of Drypool, all of which are situated in the eastern part of the city. Under the East Hull Gas Act of 1906 the name of this Company was changed, as from New Year's Day, 1907, to the East Hull Gas Company.

The first Special Act for the Hull Station was promoted in 1857, passing through the House of Commons after much powerful opposition, and receiving the Royal Assent on May 21, 1858.

In 1874 Mr. Andrew Dougall was appointed and remained Superintendent and Engineer of the Hull Station until 1901, when he retired on account of ill-health. During Mr. Dougall's period of service the business continued to flourish. Each year showed an increase in the sales of gas without a break, the quantity sold in 1901 attaining 1036 million c.ft. as compared with 237 millions in 1874. Incidentally these increases in business made it necessary again to enlarge the works and extend the mains, and further capital powers for this purpose were obtained in 1876, 1884, and 1901.

Under the Kingston-on-Hull Corporation Act, 1897, the Corporation purchased on April 1, 1898, the undertaking of the Kingston-upon-Hull Gas Company, for £92,500. They then inquired whether the British Gas Light Company would be prepared to sell them gas in bulk sufficient to meet all requirements within the limits of supply of the Kingston-on-Hull Gas Company which formerly served the Old Town; and in February, 1898, the Company's offer to supply the gas was accepted. An agreement was drawn-up, and is still in operation, which provides for revision every two years of the price to be charged—this being regulated by the cost of manufacture.

A valuable addition to the activities in the Hull district of the British Gas Light Company was made in 1902, when the Directors decided to purchase the undertaking of the Cottingham Gas Company, situated in the west of the city. The works were taken down and the land sold, and gas has since been supplied from Sculcoates to consumers in Cottingham at the same price as is charged in Hull.

When Mr. Dougall retired from the Company's service he was succeeded by Mr. John Young, who went as Engineer to the Hull Station after having successively superintended the British Gas Light Company's stations at Staffordshire Potteries and Norwich. His business career, however, commenced in Hull, for at the age of fifteen he was employed in the Company's town office there. While Mr. Young was in charge at Hull the prosperity of the station continued to improve, and in 1914 it became necessary to obtain parliamentary authority to expend further capital. The Hull Station Act, 1914, received the Royal Assent on June 30 in that year.

On Mr. Young's retirement in 1919, Mr. Harold E. Copp was appointed Engineer and Manager. Mr. Copp had previously been in charge of the Company's Staffordshire Potteries undertaking throughout the period of the war. Since his arrival in Hull, Mr. Copp has considerably extended and improved the works, to enable them to meet the still-increasing demand for gas.

In 1923, Mr. J. R. Warren completed 50 years' service as District Superintendent of this station. His resignation was accepted in August of that year, when he was granted a retiring allowance, and presentations were made to him by the Company and by the Hull staff. Mr. Warren's length of service has been surpassed by that of Mr. William Lovatt, who completed 56 years with the Company in August, 1924, and still retains the important position of Chief Clerk at Hull. Mr. Lovatt commenced as a junior at the Staffordshire Potteries Station, and was Chief Clerk there before being transferred to a similar position in Hull in 1902.

New and commodious showrooms were opened by the Company in 1924, an excellent site having been purchased in the centre of the city. The great prosperity of the British Gas Light Company at Hull must to a large degree be attributed to their having been consistently successful in supplying gas at a very cheap rate. From 1881 up to 1915, indeed, the price charged per 1000 c.ft. was 2s., or still less. For four years prior to the war the charge was 1s. 10d., and occasionally in earlier years it was actually as low as 1s. 9d. Even to-day the price is only 7d. per therm—the equivalent of 2s. 8d. per 1000 c.ft.

The capacity of the manufacturing plant at Hull is as follows:

	Nominal Capacity per Diem.
Inclined retort house	1,392,000 c.ft.
Horizontal retort house	2,400,000 ,,
Vertical retort houses (Woodall-Duckham)	4,800,000 ,,
Carburetted water gas plant (Humphreys & Glasgow)	2,600,000 ,,

TROWBRIDGE.

Norwich and Hull have always been the most important of the Company's stations. From the first years, however, the Directors were also concerning themselves with several smaller undertakings, one of which was in Trowbridge, Wiltshire. To that town, in accordance with the Directors' instructions, the Secretary had proceeded almost immediately after the formation of the Company. His purpose was to submit a tender for lighting the town. This was at the end of April, 1824, and within a month the Directors had approved plans for the erection of gas-works. It was nearly two years before these works were ready, and the manufacture of gas was commenced in February, 1826. In March, 1831, the Trowbridge Works were let on lease. The Directors declared in 1851 that they would be glad to treat for the sale of the works. However, when, two years later, the lessee died and his executors expressed

JOHN YOUNG.

Successively Engineer and Manager of the Company's Staffordshire Potteries Norwich, and Hull Undertakings. Retired in 1919.)

the wish to give up the works, the Company resumed possession of them.

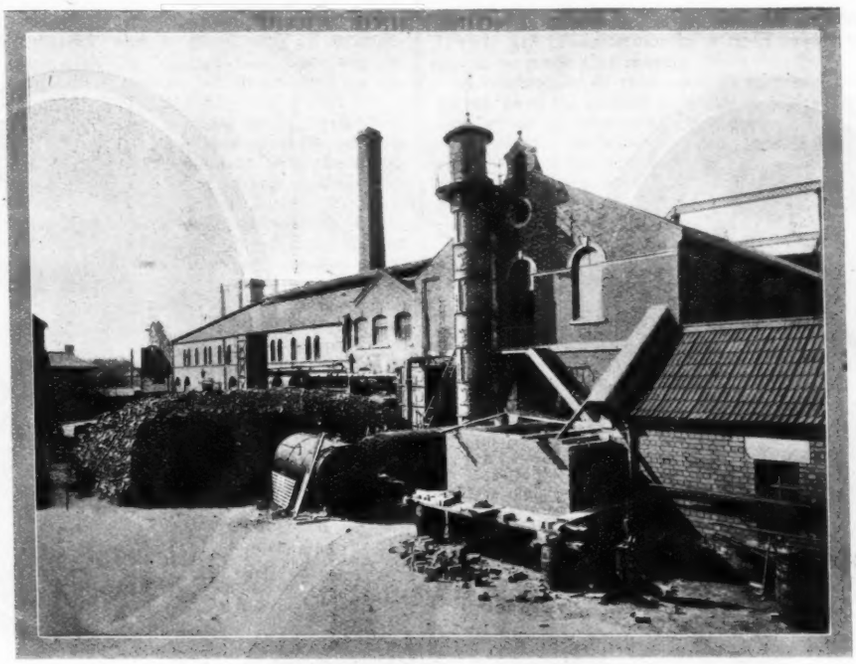
Considerable extensions were carried out in 1857, and a new tank and gasholder were erected in 1864. Fifty-five years after the erection of the works was begun, the Directors considered it advisable to seek parliamentary powers by applying for a Provisional Order. This was granted to the station in the following year, 1880. A second Order was granted in 1918, empowering the Company to expend additional capital on the undertaking. The hundredth year of activity at Trowbridge has been celebrated by the opening of an attractive showroom in the centre of the town. Mr. E. A. Sainsbury has been in charge of this station since 1920.

The Company have recently purchased a large proportion of the stock of the Bradford-on-Avon Gas Company, with the view of linking-up, at a later date, the Bradford undertaking with their Trowbridge Station. It is believed that the combination will be to the benefit of the gas consumers in both towns.

HOLYWELL.

The smallest of the Company's stations is at Holywell, North Wales. A plot of land was purchased from the Commissioners of Woods and Forests a hundred years ago in the parish of Greenfield, a mile from Holywell itself, and there the gas-works were erected. The Company are responsible for the lighting of the townships of Holywell, Greenfield, and Bagillt.

The charge for gas supplied to manufacturers in 1825 was 15s. per 1000 c.ft., with an allowance of 20 p.ct. on yearly accounts amounting to £50 or more. Ordinary consumers were charged according to the number of burners used, the prices



TROWBRIDGE STATION.

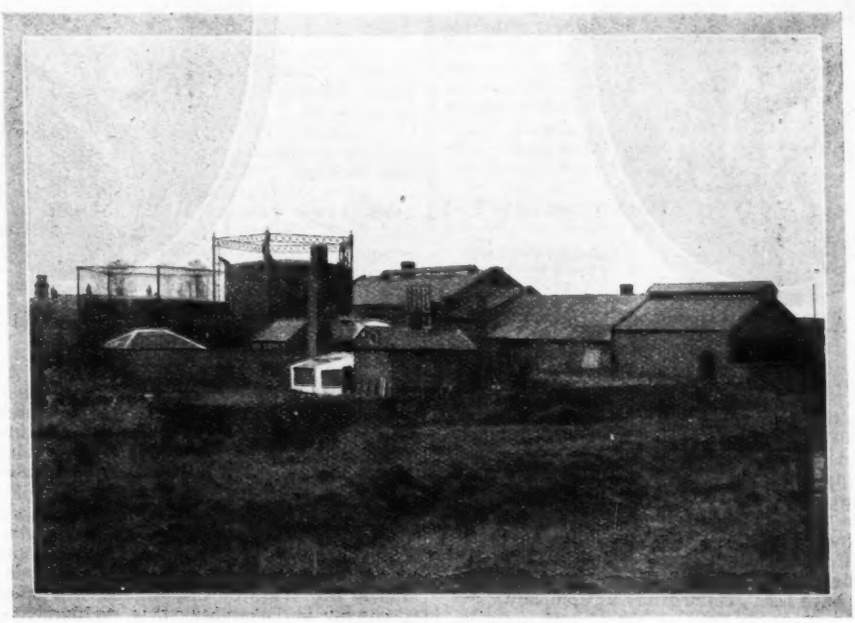
General View of Works.

being regulated by those ruling in the city of Chester. The undertaking does not appear to have flourished, however, for it had only been in existence for three years when the Secretary was instructed by the Directors to visit Holywell to dispose of the works. For some years they were leased; but in March, 1843, the Company resumed possession. Parliamentary powers were obtained by the Holywell Provisional Order of 1880. Mr. A. T. Howard was appointed Manager of the station in 1920.

STAFFORDSHIRE POTTERIES.

The Company's activities were still further extended in 1825, for in that year they established works in the Potteries district, the site being at Shelton, near Etruria. Later on, as business increased, another station became necessary, and in 1850 land was purchased at Brownhills, and new works erected which were put into operation in 1852. The working of mines and minerals under the Company's Etruria works having caused subsidence of the surface of the ground endangering the safety of the works, the Company promoted an Act to empower them to erect new works on another site at Etruria, and to authorize them to expend further capital. This Act received the Royal Assent on July 10, 1900. From the time the Company obtained their first Special Act in 1858 they had frequently been in conflict with other gas companies in the district, or with the local authorities, who made repeated attempts to acquire the Company's undertaking, whereas the Company had always been unwilling to sell.

In 1908 the six towns (Hanley, Tunstall, Burslem, Stoke, Fenton, and Longton) were federated by Act of Parliament into one county borough—namely the County Borough of Stoke-on-Trent. The first two of these towns, together with several small adoining parishes, were lighted by the Company; but Burslem, Stoke, Fenton, and Longton were supplied from four separate gas-works, all of which belonged to the County Borough. In view of the advantages of unification, the Borough Council approved a scheme, submitted to them a few years later by their Chief Gas Engineer, for the establishment of a central works for the supply of gas throughout the borough, and negotiations were opened-up with the Company for the purpose of ascertaining the price at which they would be prepared to part with their undertaking. Deputations from the Council interviewed the Directors in 1921 and 1922; and the scheme being obviously right in principle, and the Company's works and land at Etruria being eminently suitable for a central works such as



HOLYWELL STATION.

General View of the Works.

THE ENGINEERING STAFF.

HAROLD E. COPP, *M.Inst.C.E.*

C. RHODES ARMITAGE

THOMAS GLOVER, *C.B.E.*, *M.Inst.C.E.*

E. A. SAINSBURY.

A. T. HOWARD.

was contemplated, the Directors, with the approval of the shareholders, eventually agreed to sell the Company's Staffordshire Potteries undertaking, provided adequate terms were offered by the County Borough. These having been amicably arranged, the undertaking was, with the sanction of Parliament, transferred to the County Borough of Stoke-on-Trent on June 30, 1922. Thus, after 97 years, the Potteries Station passed out of the Company's hands.

The services of Mr. C. R. Armitage, the Engineer and Manager of the station, have been retained by the Company.

EAST LONDON.

For a period of years commencing with 1825, the British Gas Light Company made themselves responsible for a supply of lighting in various districts in the East of London from works which they erected in Schoolhouse Lane in the hamlet of Ratcliff. The Company obtained their first contract for lighting the public lamps in Limehouse in June, 1826. Their tender for supplying gas to the public lamps in the "hamlet," as it was then called, of Mile End Old Town was accepted by the Local Authority in August, 1825, and the lighting of this district commenced in the following month. Contracts were also entered into for lighting in the parish of St. Mary's, Whitechapel, and in the Ward of Cripplegate. An offer was made by the Company in December, 1824, to purchase the works of the Poplar Gas Light Company for 6000 guineas; but here, as at Ratcliff, when an offer was made to purchase the Ratcliff Gas Light Company's works in January, 1825, the negotiations

were not completed. However, the Company obtained some lighting in the Ratcliff district; and, in June, 1829, an arrangement was entered into with the Ratcliff Gas Company by which there was a transfer of districts, which involved an exchange of mains.

At the half-yearly meeting of the Company on July 31 of that year, Mr. J. G. Wrench (the Chairman) reported to the proprietors that the Directors had been in negotiation with the Imperial Gas Company for the purchase of so much of their district as embraced Whitechapel, Goodman's Fields, Stepney, Mile End, Bromley, Bow, and Westham; and with the Chartered Company, for the cession of a portion of their district lying contiguous to that of the British Gas Company; and that, in order to effectuate their object, it had been deemed essential to obtain an Act of Incorporation. "In the midst of clashing interests and strong opposition," a Bill for the purpose had been promoted and the Act obtained. The districts of all the London Companies had been adjusted and settled in such a way as, it was hoped, would prevent future injurious competition; and, in addition to the district heretofore possessed by the British Gas Company, that Company would light the parishes and places above-mentioned, which had been agreed to be purchased from the Imperial Gas Company, and also the greater part of the Parish of Spitalfields, which had been secured by negotiation from the Chartered Gas Company, simply at the expense of paying the fair valuation of their mains, pipes, and apparatus. The terms of purchase from the Imperial Gas Company were that the British Gas Company should pay them the sum of £16,000, with interest, by instalments, within the period of three years. At this time the capital expended on works and mains at the London Station amounted to £70,000.

The Act referred to was the British Gas Light Company's Act of 1829, by which the London Station became incorporated, and consequently severed from the other stations, which thereafter constituted what was known as the Provincial Company, until the year 1852, when the London Station was acquired by the Commercial Gas Company.

MISCELLANEOUS.

Among the proposals which the Company received in their first years was one that came from a firm of gas contractors who offered the contract which they had entered into for lighting the town of Clonmel in Ireland, and to complete the erection of the works. The offer was accepted, and the lighting of the town was commenced by the British Gas Light Company in February, 1825. Five years later the works were let on lease. Eventually, in 1895, the Company sold the undertaking to the Clonmel Corporation.

At Ayr, the Directors signed a contract with the magistrates and town councillors in December, 1825, for lighting the town with gas. The works were completed, and lighting commenced in April of the following year. The Company let the works on lease for a short period, and in 1832 sold the undertaking.

Recently the Company obtained a controlling interest in the Swanage Gas Company, which has since absorbed the Swanage Electricity Supply Company, Ltd., and is now known as the Swanage Gas and Electricity Company. Improved plant is in course of erection, and it is hoped that the joint working of the two undertakings on one site will prove to be to the advantage of the consumers, as well as of the Company.

In January, 1897, the Company's Secretary, Mr. F. L. Linging, resigned after 38 years' service with the Company. At the end of the same year he was appointed a Director. Failing health necessitated Mr. Linging's retirement from the Board in 1900, and his death occurred on June 15, 1901. Mr. Linging was succeeded in the secretaryship by Mr. H. B. Chamberlain, who had been the Company's Accountant for many years. At Mr. Chamberlain's death in 1907, Mr. A. W. Brookes was appointed Secretary, a position he still retains.

For 98 years the headquarters of the Company were situated at No. 11, George Yard, Lombard Street, London. These premises having been sold, it became necessary for the Company to seek a new chief office, and they were fortunate in securing a building at No. 2, The Abbey Garden, Westminster, admirably adapted to their requirements, to which they moved on Feb. 1, 1922. The office is beautifully situated in the garden of the Abbey.

Thirteen years ago, on the suggestion of the Chairman, Mr. J. Horsley Palmer, the Board introduced a scheme for the recognition of long service, under which all who have completed 25 years' continuous service with the Company are presented with a silver medal. A framed certificate accompanies the medal, and in the case of those on the wages list a gratuity of £5 is also awarded. The first distribution of these medals and certificates took place at Norwich in February, 1912. The youngest member of the Board, Mr. L. R. Wilkinson, presided on that occasion, and, when a similar ceremony was performed at Hull in May of the same year, the Chairman made the presentation. Addressing an assemblage of 600 men, Mr. Palmer stated that he understood there was hardly any other industrial concern in England which had established such a system, and it was arousing much interest at all the stations. Indeed, the Curator of the Hull Museum asked to be supplied with two specimen medals for preservation among the local exhibits. Already 348 presentations have been made, while 17 more are due to be made this month.

In celebration of their centenary, the Company entertained the whole of the employees of the several stations, together with their wives or other relatives, at the British Empire Exhibition at Wembley. An announcement was then made that, in further celebration of the centenary, the Board intended to inaugurate a definite pension scheme in place of the existing scheme, under which employees who had served the Company for a number of years were granted allowances during the pleasure of the Court. The new scheme is now in operation.

A. W. BROOKES.
Secretary.

Entered the Company's service May 22, 1878. Appointed Secretary on Jan. 1, 1908.

THE GREAT WAR.

During the Great War 452 of the Company's employees joined the Colours. A Director (Mr. H. G. Palmer) also served. The number who fell on active service was 62, and the part they played in that unforgettable conflict has been memorialized for future ages at the Company's principal station. Facing the entrance to the Hull works, a surgery has been erected, and outside the building a memorial tablet affixed upon which the names of the fallen are inscribed. They are surmounted by a laurel wreath in bas-relief and the epitaph: "These Names shall Remain for Ever and Their Glory shall Not be Blotted out."

PROGRESS OF BUSINESS AT THE PRINCIPAL STATIONS.

Gas Sold during the Year ended Dec. 31.	Hull, C.Ft.	Norwich, C.Ft.
1857	58,108,700	67,599,000
1877	316,154,021	254,477,900
1897	807,895,595	275,975,500
1917	1,373,396,698	691,076,300
1923	1,572,821,628	748,452,840

Institution of Mining Engineers.—The summer meeting of the Institution will be held at Cardiff from June 16 to 19. The programme, which will include visits to collieries and works in South Wales, will be issued in due course.

Notes on Pension Schemes.—From Mr. F. B. Reynolds, Manager of the Pensions Department of Messrs. Muir Beddall & Co., Ltd., No. 4, Bucklersbury, London, E.C. 4, we have received a useful little booklet entitled "A Few Notes on Pension Schemes." Readers of the "JOURNAL" who would like to have a copy of this publication should communicate with Mr. Reynolds.

GAS BILLS FOR 1925.

(*Concluded from p.* 143.)

The ROCHDALE CORPORATION, like the last two mentioned, are promoting an omnibus Bill, which contains a part relating to gas. There are the clauses regarding freedom from obligation to supply for other than lighting or domestic purposes where the mains are of insufficient capacity, anti-fluctuators for gas engines, and valves where high-pressure air is used. The Corporation, among other powers of a general character, ask for authority to lay mains in private streets, and to make reasonable stand-by charges. A clause with reference to the repair of fittings is in the following terms:

> If in the opinion of the Corporation any waste of gas or injury or risk of injury to person or property is caused or likely to be caused by reason of any injury to, or defect in, any fitting or appliance used for the supply of gas and belonging to a consumer, it shall be lawful for the Corporation to execute such repairs to such fitting or appliance as they may think necessary or expedient in the circumstances of the case, without being requested so to do; and if any injury to, or defect in, any such fitting or appliance shall have been found, the expenses incurred by the Corporation for the purpose of ascertaining the injury or defect and executing the repairs shall be recoverable by the Corporation from the owner of the premises supplied, or, in cases where the fitting or appliance is repairable by the occupier of such premises, from the occupier, in like manner as the gas rates in respect of the supply of gas to the premises are recoverable: Provided that except in case of emergency the Corporation shall not under the powers of this section enter into any house or private premises unless they shall have given notice to the occupier of such house or premises, and, in any case where the fitting or appliance is repairable by the owner thereof, to such owner not less than twenty-four hours' previous notice of their intention so to enter.

[*Parliamentary Agents: Messrs. Sherwood & Co.*]

The SOUTH METROPOLITAN GAS COMPANY'S Bill to allow of agreements between them and other gas undertakings for mutual assistance, and for other purposes, was reviewed in the "JOURNAL" for Dec. 24, p. 842. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The STOCKTON-ON-TEES CORPORATION Bill, providing for the transfer to them, by agreement, of the undertaking of the Haverton Hill-on-Tees Gas Company, Ltd., was reviewed on p. 83 of the "JOURNAL" for Jan. 14. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The UCKFIELD GAS COMPANY, LTD., were in 1858 incorporated under the Joint Stock Companies Act for the purpose (among other things) of manufacturing and supplying gas in Uckfield; and the paid-up capital is now £9000, divided into 1800 shares of £5 each. There are, in addition, debentures to the amount of £1900. Upon the issue of shares the Company have received by way of premium the sum of £1092 5s. 10d., upon which they have not paid any dividend or interest. Further, they have provided out of undivided profits upwards of £3000 which they have expended in extending, enlarging, and improving their works, or are now using as working capital, which expenditure is properly chargeable against capital. The Company are now promoting a Bill for their dissolution and reincorporation with further powers, and with authority to supply both gas and electricity within limits defined. The demand for gas in the urban district of Uckfield supplied by the Company has increased, and is increasing, and other parishes in the neighbourhood are, says the preamble, wholly without a supply of gas, and can be conveniently supplied from the works of the Company; and it is expedient that the works and mains of the Company be extended and improved.

It is proposed that the incorporation of the Company under the name of the Uckfield Gas and Electricity Company shall take place as from Oct. 1 next. The capital of the new Company shall be £40,000, of which £10,800 shall be substituted for the existing share capital, and £29,200 may be raised in manner prescribed. The £10,800 of original capital will be issued as ordinary stock and divided among the existing holders of ordinary shares in the proportion of £6 of such stock for each £5 share held by them. The additional capital may be raised as gas or electricity ordinary or preference stock, but the total of £29,200 is to include any premiums that may be raised by the sale thereof by auction or tender. Borrowing powers are asked up to one-half of the capital for the time being raised, but mortgages and bonds of the limited Company existing at the date of re-incorporation are to have priority over subsequent mortgages and debenture stock in respect of the gas undertaking, though they are to have no claim against the electricity undertaking. All money raised for the purposes of the gas undertaking or the electricity undertaking, including premiums, shall be applied only to the purposes of the undertaking in respect of which it is raised, and separate capital and revenue expenditure accounts are to be kept for each undertaking, with due apportionment of management and other common expenses. The interest on gas preference capital is not to exceed 6 p.ct., and the standard rate of dividend on the gas capital is to be 7 p.ct. on the amount actually paid up. Surplus profits up to a total of one year's dividends (including borrowed money) may be carried forward. Power is sought to create reserve and special purposes funds. Meetings are to be held yearly in the month of June. A Managing Director or Managing Directors may be appointed.

The limits of supply scheduled are the urban district of Uckfield; the parishes of Hadlow Down, Framfield, East Hoathly, Little Horsted, Isfield, Fletching, Danehill, and Maresfield, and part of the parish of Buxted; the parishes of Barcombe Newick and Chailey, in the rural district of Chailey; and so much of the Road from Lewes to Tunbridge Wells as abuts upon the parish of Hadlow Down and is situate in the parish of Waldron or Mayfield, in the rural district of Uckfield, and so much of the last-mentioned parishes as is situate within 100 yards of that portion of this road. The proposed standard price of gas is 1s. 6d. per therm; the ordinary dividend to be increased or reduced by ¼ p.ct. in respect of each one-fifth of a penny reduction or increase below or above the standard price. It is provided that, as from the passing of the Act, the power of the Crowborough District Gas Company to supply gas and electricity in the parish of Hadlow Down and in the portion of the parish of Buxted already alluded to, and the rights of the Lewes Gas Company to supply gas in the parish of Barcombe, shall cease. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

The WALLASEY CORPORATION are promoting a Bill to secure a number of objects, and one of these is the extension of the borough boundaries so as to include the immediately adjoining township of Moreton and part of the township of Bidston-cum-Ford. They ask that, as from the date of this extension—the "appointed day" being April 1, 1926—the gas and water limits of the Corporation shall be increased accordingly, and that the Hoylake and West Kirby Gas and Water Company shall sell to the Corporation the portion of their undertaking which is situate within the added areas for such price as, failing agreement, may be determined by arbitration. There are in the Bill a number of general provisions relating to the Gas Department. The stand-by clause stipulates for a charge which will give a reasonable return, but it is "provided that the sum to be paid under this section shall not exceed 5s. in respect of any one quarter of a year in cases where the nominal capacity of the meter through which the gas is supplied, or to be supplied, does not exceed 120 c.ft. per hour, nor 25s. in respect of any one quarter of a year in cases where such nominal capacity exceeds 120 c.ft. per hour but does not exceed 1500 c.ft. per hour." Power is taken to fit-up showrooms and offices. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

PROVISIONAL ORDER.

The BEXHILL WATER AND GAS COMPANY are applying to the Ministry of Health for a Provisional Order, under the Gas and Water Works Facilities Act, 1870, to enable them to construct and maintain further works in connection with their water undertaking. They also desire to hold annual, instead of half-yearly, meetings, and to create a renewal fund up to 10 p.ct. on the paid-up capital for the time being (this fund to be additional to the reserve fund). The following clause as to qualification of Directors is inserted:

> Notwithstanding anything in the Companies Clauses Consolidation Act, 1845, no person shall be disqualified from being a Director of the Company by reason of his holding any office or place of trust or profit under the Company or by reason of his being interested in any contract with the Company, nor shall any Director be required to cease from voting or acting as a Director by reason of his accepting any such office or place of trust or profit or becoming interested in any such contract: Provided that in case of his being or becoming interested in any contract with the Company, whether such interest shall arise before or after his appointment as a Director, the nature of his interest in the contract shall be disclosed by him at the meeting of the Directors at which the contract is determined on if his interest then exists, or in any other case at the first meeting of the Directors after the acquisition of his interest or after his appointment, and also in the next annual report of the undertakers, and that no Director shall as a Director vote in respect of any such contract; and if he does so vote, his vote shall not be counted. But this prohibition shall not apply to any contract by, or on behalf of, the undertakers to give to the Directors or any of them any security by way of indemnity.

[*Solicitors and Parliamentary Agents: Messrs. Blyth, Dutton, Hartley, & Blyth.*]

The Sir John Cass Technical Institute.—The annual prize distribution will be held at the Institute, Jewry Street, Aldgate, E.C. 3, on Tuesday, Feb. 10, at 8 o'clock.

Cement and Asbestos Gas Mains.—The Pennsylvania Public Service Information Committee mention a new pipe which is made of layers of Portland cement mixed with asbestos fibre, welded into a compact mass, and strong enough to withstand a pressure of 300 lbs. per sq. in. A coating of water-glass makes the pipe completely gas-tight. Among the advantages of the new fibre pipe over the cast-iron main are the following: Low cost, immunity from stray electric currents, decreased susceptibility to cold, lightness and ease of transportation, and the fact that it can be drilled, screwed, and sawn like wood.

RAPID ERECTION OF GAS-WORKS BUILDINGS.

Two recent examples of steel-framed buildings built for provincial gas undertakings are shown in our two illustrations, and are of interest mainly on account of the rapidity with which they were erected.

Fig. 1 shows in skeleton a new retort-house built for the Stretford and District Gas Board, which had to be erected with the minimum of delay. Owing to the very rapidly increasing demand for gas throughout the Trafford Park manufacturing area, which draws its supply from the Stretford undertaking, an additional retort-house was urgently needed. In the Trafford Park district the demand is mainly for industrial purposes, but the use of gas for domestic cooking and heating has greatly increased during the last two years; the output having risen during that period by approximately 30 p.ct. For the new retort-house the foundations are of reinforced concrete, and were laid down by the Board's own workmen; the stanchion bases of the retort-house and retort-bench framing being carried on continuous beams of reinforced concrete. On each stanchion carrying the coal hoppers the load is equivalent to 55 tons. Work on the foundations for the house and the retort bench was commenced on March 20, and completed on June 30, 1924.

Within five weeks from commencing work upon the steel framework, all the steelwork, which weighed upwards of 220 tons, had been erected. Messrs. Redpath, Brown, & Co., Ltd., of Trafford Park, acted as sub-contractors to Messrs. R. Dempster & Sons, Ltd., of Elland, and supplied the steelwork for the retort-house framing, floors, stanchions, and retort-bench bracing. Measuring 110 ft. in length, the building has a roof span of 64 ft. and is 46 ft. 3 in. high to the roof eaves. Girders that form part of, and are used in conjunction with, the roof trusses serve to carry a telpher track for conveying coal to the hoppers above the retort-house—a moving load of 10 tons being arranged for. The whole of the work, including the building of the retort benches, the brickwork filling, and the construction of the steelwork for the telpher track, was completed by Nov. 26, 1924; the new plant being brought into use for gas making on Jan. 10 of this year.

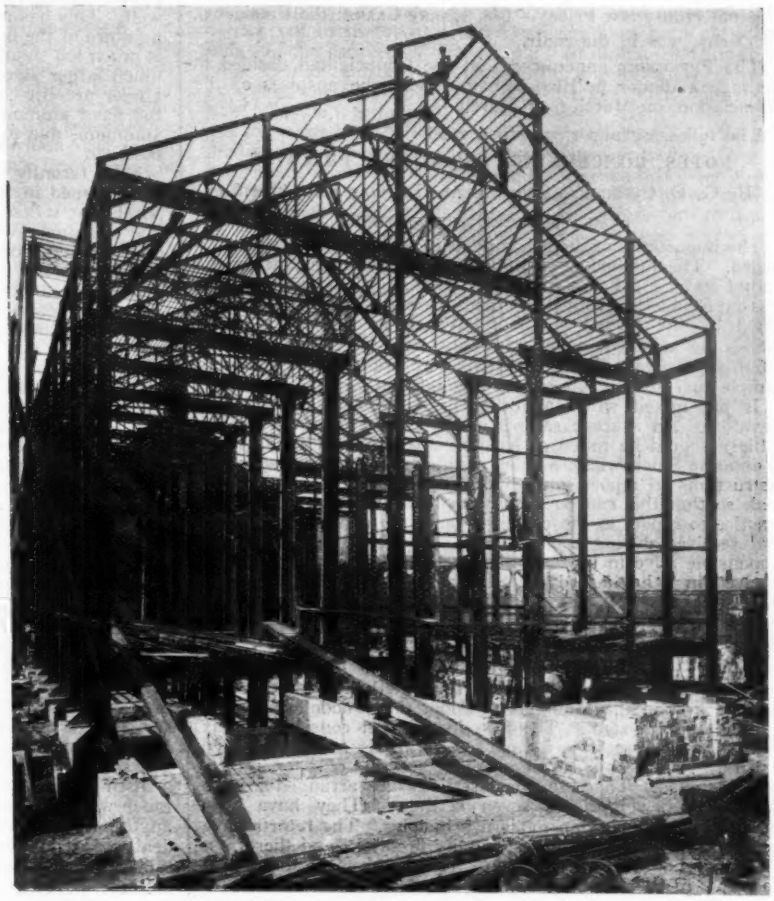


FIG. 1.—FRAMEWORK OF RETORT-HOUSE FOR THE STRETFORD BOARD.

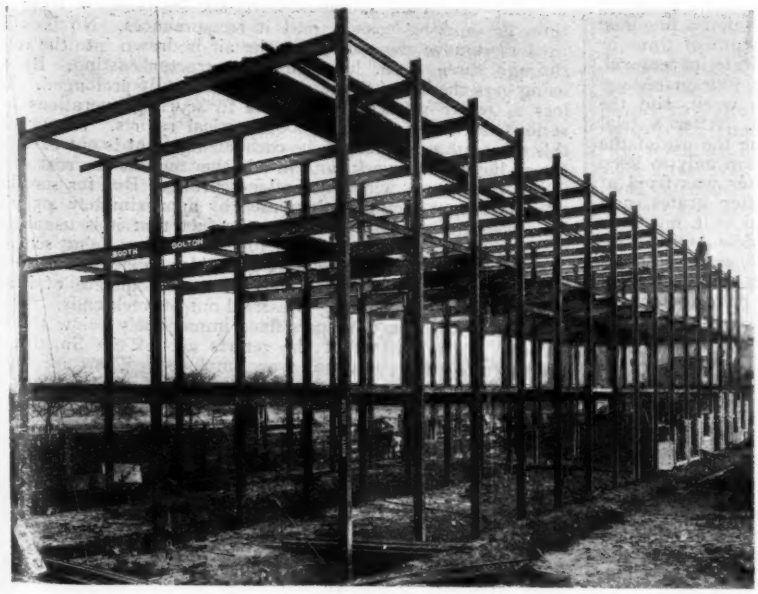


FIG. 2.—ELEVEN DAYS' WORK AT BOLTON.

Fig. 2 has been reproduced from a photograph of the skeleton steelwork for a three-storey building constructed recently for the Gas Department of the Bolton Corporation. This building is nearly 200 ft. in length, by 41 ft. in width, and 42 ft. in height. It is intended for workshops and stores. The steelwork was supplied and erected by Messrs. John Booth & Sons, Hulton Steel Works, Bolton. It is a remarkable testimony to the rapidity with which a substantial and permanent steel framework can be assembled, that the whole of this skeleton building was erected complete in 11 working days, by a squad consisting of 10 men only; the actual working hours being 88. This performance is more remarkable from the fact that the constructional work was hampered by rain and fog, as well as by the short working days available in winter, while the steelwork all had to be brought 100 yards over soft ground. The time is inclusive of that occupied by the work of setting-out, erection, levelling, and plumbing-up.

District Association Reports.

After a break, from force of circumstances, extending over four years, the publication has been resumed of the volume containing the "JOURNAL" reports of proceedings of the various Associations of Gas Engineers and Managers in England, Scotland, Ireland, and Wales. Over a long series of years—considerably more than a quarter-of-a-century—these combined reports, in readily accessible form, were found to be of great value in the libraries of gas men; and the volume for 1924, which is now ready, together with subsequent issues, will certainly prove no less useful. From the point of view of District Association work, as in other directions, the past year was an important one. As a matter of fact, glancing along our own bookshelves, we see no other volume of the series which contains so many pages as that for 1924—copies of which may be had from the "JOURNAL" Office, at the price of 10s. 6d., including postage. The style and binding have been maintained uniform with earlier volumes; and the book is fully indexed, and contains lists of officers and members of the different Associations.

MIDLAND JUNIOR GAS ASSOCIATION.

There was a meeting of the Association at the Birmingham Council House last Friday. Mr. HARRY CLARK (the President), of Derby, was in the chair.

The PRESIDENT announced that the Council had decided to arrange a dinner in Birmingham, under the auspices of the Association, on March 6 or March 15.

The following paper was then read.

NOTES CONCERNING GAS-WORKS PRACTICE.

By G. E. CURRIER, of the Smethwick Gas Department.

COAL SAMPLING AND TESTING.

The importance of the ash content in coal has been repeatedly urged. The method of sampling is equally important as the actual test for ash. Sampling by mechanical means is doubtless preferable to doing it by hand—personal error being eliminated by the former method. Where mechanical methods cannot be adopted, hand sampling should receive the personal supervision of the chemist. Of course, it is easier to sample coal after it has passed through the breaker, providing it is not mixed with any other in the receiving hopper or elevators. An average sample of the coal received from each colliery should be taken at least weekly, and analyzed. This is done at Smethwick; and in addition the coal unloader has instructions to report immediately an obviously bad truck of coal, so that this can be dealt with separately. It is also the practice to report to the colliery agents the ash content of the coal received during each month. This helps to keep those responsible alive to the fact that their commodity is not being received in a haphazard manner, but is subjected to regular examination. In the case of nuts and beans, it is important that the specified sizes are adhered to, and periodical bulk samples taken and screened to check this.

CARBONIZATION—CONTINUOUS VERTICAL RETORTS.

I think I am correct in saying the Smethwick undertaking was the first in the Midlands to adopt the Woodall-Duckham vertical retort system. The first installation consisted of six settings of 5-ton retorts—*i.e.*, 24 retorts in all—and was erected in 1911. In 1914 an additional eight settings of 5-ton retorts were installed. These fourteen settings are arranged in two benches, each comprising seven settings. They have been entirely reconstructed on modern principles. The retorts have been built-up chiefly with best quality firebrick, and there is a belt of siliceous material about 6 ft. 3 in. deep at the top of the retort in the hottest zone. In this zone the back walls of the combustion flues are built of silica. The introduction of step-grate furnaces has resulted in fuel economy, and less arduous work for the men. The furnaces are pricked up, fronted, and ashed-out once every 8-hour shift; and during two years continuous operation, it has never been necessary to clinker one of the new furnaces. It was found that a fine dust collects at the back of the furnaces for the depth of three or four drip plates from the bottom; and to facilitate its removal, a special fork is placed in the furnace about four plates up. It is only necessary to use this tool twice a week, and the operation only takes four or five minutes. After a trial with one furnace, it was decided to discontinue the use of the water drip on all the furnaces, and to use steam only to keep the grate cool. A steam pipe of ⅜ in. diameter was fixed at each side of the furnace, parallel with the step grates, and each pipe had three ⅛ in. diameter holes drilled in it, one near the bottom, one near the top, and one in the middle. Of course, the cutting action of the jets of steam soon caused these holes to increase in size; and new steam pipes have now been fixed in all the furnaces, and proper steam nozzles have been fitted to these pipes. The steam pressure is regulated to 17-lbs. per sq. in. The steam jets have kept the grates cool without the use of any water whatsoever. The hydrogen content of the producer gas is increased by the use of steam in the producers, and a shorter flame results in the combustion flues. This, however, can easily be adjusted by the dampers and secondary air regulation.

An interesting and successful innovation has been introduced in one of the new settings. An auxiliary supply of secondary air is provided in each combustion flue about 27 in. below the usual secondary ports, and is controlled by a damper. By means of this auxiliary secondary air a longer flame is obtained in the combustion flues, with consequent improvement in the bottom heat, which is so essential to successful steaming. The fuel consumption of the furnaces is usually expressed as so many pounds per hundred pounds of coal carbonized. Where the steaming process is in operation the figure is apt to be misleading, as this process is usually accompanied by a reduction in the throughput of coal. A better method would be to express the fuel consumption as pounds of fuel per therm.

Cleanliness is insisted on in the retort house, and the time thus spent is amply repaid by the better working conditions. If cleaning of the carbonizing plant is carried out systematically each shift, the actual time taken for this work is comparatively small. Efficient liquor sprays have been fixed in all the foul mains and in the uptake mains from the seal pots, so that the latter receive a continuous supply of liquor to maintain the required seal. Without these liquor sprays, and with steaming in practice, pitch troubles in the foul mains would inevitably follow. These troubles are now practically unheard of at Smethwick. The hot liquor from the retort-house should be passed through a suitable cooler before entering the storage well. This has not yet been done at Smethwick; and the temperature of the liquor in the present well, the capacity of which is much too small for the present make, is about 140° Fahr. A much larger storage well is to be provided in the near future. Under present conditions there is likely to be an increase in the fixed ammonia content of the liquor, and a loss of free ammonia, due to the high temperature of the liquor entering the well.

Until recently the deposits fished out from the seal pots have been burned in the producers. This is an easy means of disposal, but it has the disadvantage of increasing the costs of flue cleaning, owing to the increased quantity of dust in the producer gas flues. The practice has been discontinued, and the deposits are now disposed of outside the retort-house. The question is sometimes raised whether each retort should have a separate seal pot, or whether the gas from two or four retorts should pass through only one seal pot. It is chiefly a question of the area; but at Smethwick there is one seal pot to each setting of four retorts, and no trouble is experienced so long as the liquor sprays are in action.

It is customary to charge the auxiliary coal hoppers every two hours, but it assists the foremen and others responsible if the stokers allow the hoppers to run nearly empty before recharging, and then chalk on the hoppers the actual time of recharging. It is then possible to see at a glance how each retort is working.

The heat regulation of the settings receives constant attention. The shift foremen inspect the temperature of the combustion flues four times during each shift, and make any necessary adjustments to the various dampers. The temperatures are taken daily with a "Cambridge" optical pyrometer. All damper adjustments are recorded by the foremen in a special book which has often proved useful for reference. Analyses of the waste gases are periodically made. An average temperature of 1250° C. is aimed at in all the combustion flues, and any flue over 1280° C. is immediately checked. It has not been necessary to screen the coke for the producers, though in some plants this is often helpful in maintaining heats.

A messroom built on the same level as the charging stage is a distinct advantage, as it means that the top men can be in touch with the plant during the whole of each shift, and should anything untoward occur during meal-times, they are able to deal with it immediately. The pull in the foul mains is maintained at from level gauge to ½-tenth inch water column.

Retort-house governors are not employed, and are not necessary providing the exhauster governor is sensitive and reliable, and the arrangement of foul mains is such that the pull is equalized on all benches and sections in the house.

The retorts are scurfed every five weeks, and the time taken for this operation averages thirty-six hours—*i.e.*, from the time gas-making ceases until it recommences. No bars are used to remove the scurf, and the air is drawn into the retort through three 1½-in. holes in the extractor casting. By not using bars the life of the retorts is undoubtedly prolonged. The loss of retort working hours due to scurfing operations is a serious drawback to continuous vertical retorts. In our case this means that 20 p.ct. of the carbonizing plant is out of action for 36 hours each week, and in addition there is the cost of refilling the retorts with coke after scurfing. But for scurfing, the gas output would be increased by approximately 4·5 p.ct. This does not take into account the fact that it is usually 24 hours before the retorts are on full make after being scurfed. Owing to our totally inadequate gasholder capacity, and to reduced consumption at week-ends as a consequence of heavy industrial load, all scurfing is carried out at week-ends.

The coke discharge hoppers fixed immediately below the extractors at the bottom of the retorts are of the Smethwick pattern, and not the usual type employed. They are much simpler in construction, and were first made of mild steel, owing to war conditions. The life of the steel hoppers was about four to five years, and they have now nearly all been replaced by hoppers made of cast iron. The one disadvantage of this type of discharger is that, when the door is opened for the coke to discharge, the water forming the seal is emptied with the coke into the skip. By no means all the seal water is absorbed by the coke, as the moisture content of the coke is generally about 2 to 3 p.ct., and no complaints have been received. An experiment was made with a water-sealed door which had a container attached to receive the water at each discharge, and thus prevent wastage of water. But this was not successful, owing to the container becoming choked with coke dust. This pattern of discharger results in a saving of labour, as there is no accumulation of dust to remove each day, as is customary with the other types. Again, the cost of repairs and renewals is less.

When the installation of a continuous vertical retort plant has been decided, the next question is the size of retort, whether 3-ton, 5-ton, or 7-ton. I have had no experience with the first-named size, but in one respect the 5-ton retort has an advantage over the 7-ton one. This is when an unsuitable coal or mixture of coals is being carbonized, and difficulty is experienced in keeping the charge travelling regularly, and in preventing hanging-up of the charge. Then the stoker has a better chance of

overcoming this trouble, without the necessity of emptying the retort and re-coking, in the case of the smaller retort. The human element is a most important factor in the satisfactory working of continuous verticals, particularly when varying mixtures of coals are carbonized. A stoker has more control over the working of a 5-ton retort when trouble is experienced with hanging-up of the charge, or the formation of scurf, or the poor condition of the retorts when they are due for re-setting, or a combination of these conditions, than he has over a 7-ton retort. It is also doubtful if the latter provides any reduction in labour costs compared with the former. Durham coal is not so suitable for continuous verticals as are coals from seams in the Midlands and South Yorkshire.

Temporary Sunday shut-downs presented some difficulties in the early days of continuous verticals; but a plant can now be shut down for eight hours or eight days, and restarted with ease. Some few years ago I assisted in comparing the costs and working results over a number of years when the plant was worked through on Sundays, and when it was shut down from 6 a.m. till 10 p.m. When all costs and results were taken into consideration, it was found that there was very little difference in the sum total financial results obtained by either method of working. But the life of the plant is undoubtedly prolonged by working through; and provided the holder storage and week-end consumption will allow of this, it is the better policy.

The following are the results obtained from the reconstructed settings at Smethwick for the nine months ended Dec. 31, 1924.

Coal carbonized, tons as received	33,817
Gas made, total, uncorrected, c.ft.	586,249,000
" " " corrected to 60° Fahr. and 30 in., c.ft.	580,118,200
Gas made, corrected, per ton of coal as received	17,155
C.V. of gas, B.Th.U. gross per c.ft.	450
Gas made, therms per ton of coal as received	77·20
Average number of retorts at work	32·5
Make of gas per retort per day, c.ft. corrected	64·91
" " " " therms	292·95
Coal throughput per retort per day, tons	3·78
Tar made, gallons per ton of coal	15·33
Liquor made, gallons 10 oz. per ton of coal	30·53
Coke, breeze, and dust for sale per ton of coal, including same available for carburetted water gas manufacture and works boilers, cwt.	10·34
Fuel to furnaces, lbs. per 100 lbs. of coal	15·83
" " lbs. per therm	4·59
Steam to retorts, p.ct. on coal carbonized	23·3
Average temperature of combustion flues	1,240° C.

The coals carbonized are as follows:

	P.Ct.
South Yorkshire	64
North Staffs	36
Coal	26
Nuts	74

These coals are drawn from six collieries only. The average analysis of coal received over a number of months was as follows:

	P.Ct.
Moisture	2·94
Ash	5·7
Volatile matter	33·80
Chlorides	0·028 (as Cl_2)

The coals used have a low ash content, and a chloride content, calculated as chlorine, not exceeding 0·10 p.ct. The ash content is also important with regard to coke sales, as there is a good market in Smethwick for coke for industrial purposes. The chloride content should be as low as possible, especially when the steaming process is in operation, to prevent undue disintegration of the top brickwork of the retorts. An average gas analysis is as follows:

	P.Ct.
CO_2	4·91
O_2	1·23
C_nH_m	2·08
CO	12·28
CH_4	21·58
H_2	45·96
N_2	11·96 (by difference)
Sp. gr.	0·494
Calorific value (calculated)	453 B.Th.U.

The gas supplied to the district has a calorific value of 450 B.Th.U. gross per c.ft.

The steam consumption in the retorts has been calculated from the actual present sizes of the steam nozzles. If the consumption were calculated from the original diameters of these nozzles, it would only amount to 13 p.ct. at the present working pressures. It is important to examine the nozzles periodically, and replace them when necessary. If all the nozzles have increased in diameter to the same extent, the pressure can then be correspondingly reduced.

It is not claimed that these figures are in any way a record or the limit of the plant. The aim has been to obtain good all-round results, consistent with getting the utmost life out of the settings. The working temperature of the settings are a good average, but perhaps rather lower than those obtaining in some plants. The settings have not been forced to their limit; but it is hoped that these working temperatures, together with the comparatively low chloride content of the coal carbonized, will result in reducing the future costs of repairs and renewals to a minimum. The nominal capacity of each setting when making straight coal gas is 250,000 c.ft. per diem, but with steaming, and the coal throughput given, the make per setting has been 260,000 to 275,000 c.ft. per diem. The only repairs so far carried out in the reconstructed settings have been partial relining of the furnaces after two years' continuous working, and pointing the retorts. The shape of the retorts has remained excellent; there being no signs of distortion. The only roughness is in the top four feet of brickwork.

Two waste-heat boilers have been installed at Smethwick to deal with the gases from the reconstructed settings. They are horizontal, multitubular, firetube boilers, each being designed to deal with the gases from eight settings. The tubes in No. 1 boiler, which was first put to work in June, 1922, are 16 ft. 3 in. in length, have an outside diameter of 2¼ in., and number 250. The boiler shell is 6 ft. 9 in. in diameter, and attached to the boiler is an economizer in which there are 152 tubes, each being 5 ft. 11 in. in length. The diameter of the economizer shell is 5 ft. No. 2 boiler was first started to work in January, 1924, and has 248 tubes of 2¼ in. outside diameter, and 16 ft. in length. There is no economizer attached to this boiler. Induced draught fans driven by a 22 H.P. De Laval steam turbine are coupled to the economizer in the case of No. 1, and in the case of No. 2 to the boiler. Provision has been made for the discharge of the gases from the fans direct to atmosphere or to the chimneys. Each boiler has a superheater, which is fixed in the waste gas flues immediately before the boiler.

Condensation of Gases.

When No. 1 boiler was first started-up, it was only practicable to put the waste gases from four reconstructed settings through this boiler, owing to reconstruction work then proceeding. The temperature of the gases leaving the economizer was only 270° to 300° Fahr., and condensation of water vapour took place, with a consequent formation of sulphuric acid, which attacked the cone end of the economizer. To prevent further condensation, and increase the temperature of the outlet gases when working the boiler at half load, air was admitted at the inlet of the boiler. This considerably reduces the efficiency. Another solution would have been to plug up a number of the boiler flues; but as the difficulty was only temporary, the former method was adopted. It is certainly inadvisable to reduce the temperature of the outlet gases below 325° Fahr. During the last 18 months the temperature has been down to this figure during holiday periods without any condensation taking place.

The figures given on the following page are the results of tests made with the boilers at Smethwick. Unfortunately the tests are only of short duration, as the present arrangement of plant does not allow of long period tests. In the case of No. 2 boiler, the heat recovered is more than the heat obtained from the carbon balance by 2·94 therms per hour. This may be due to infiltration; and if this is allowed for, the efficiency is reduced to 57 p.ct.

Thermo-electric pyrometers were used to determine the temperature of the gases at the inlet of the superheater. The volume of water was measured cold by a water meter placed before the preheater, and checked by the measurement of feed water in the overhead storage tank at the start and finish of each test. In each case the coal carbonized and gas made by the seven settings was calculated. The coke to the furnaces in No. 2 test was actually weighed; but in No. 1 test the weight was calculated. The waste gas flues from the settings to the boilers are above ground, and No. 1 boiler was last cleaned five weeks before the test, and No. 2 boiler six weeks before.

Pan Ash.

Practical tests have been made with the ash from the vertical retort plant at Smethwick, which show that the recoverable breeze and coke is from 15 to 22 p.ct. This is a comparatively low figure, and points to good working of the retort furnaces. But 15 p.ct. of coke and breeze in the ash represents a loss to Smethwick of approximately 110 tons per annum, and this is a reduction by 70 p.ct. on the loss obtained prior to the installation of step-grate furnaces. It should be remembered that it is extremely doubtful if the recovered coke and breeze will have the same market value as that produced direct from the retorts. In one of the tests mentioned, the calorific value of the coke was 10,840 B.Th.U. per lb., whereas the new coke has a value of 12,900 B.Th.U. Also the appearance of the recovered material is not so good; and this is an important point. Some plants can be adapted for breeze washing; and this is an advantage where there is a market for breeze. The ashes from the generators of the carburetted water gas plants usually contain large quantities of breeze and coke, and we find it even pays to hand pick these ashes.

Lubrication.

The system of the supply of lubricants on the basis of gas output has much to commend it to the gas engineer, for it provides for the supply of all the various grades of oils and greases over a certain period by one contractor at a rate per million c.ft. of gas sold. The contractors supply only the best lubricants, give expert advice, and do everything possible to assist the gas engineer to reduce the costs of lubrication to a minimum. The use of the best lubricants, the choice of the most suitable lubricators, the filtering of certain grades of oil to allow of their being re-used, and the careful regulation of the oil drip to each

Boilers at Work.	No. 1. Boiler dealing with Waste Gases from Seven Settings.	No. 2 Boiler dealing with Waste Gases from Seven Settings.
No. of test	1.	2.
Date	9/12/24	11/12/24
Duration of test	9 a.m. to 3 p.m.	10.30 a.m. to 6 p.m.
Temperature of waste gases at the inlet of the superheater, ° Fahr.	1,010	1,009
Temperature of waste gases at the outlet of the boiler, ° Fahr.	446	497
Temperature of waste gases at the outlet of the economizer, ° Fahr.	381	..
Temperature of the feed water inlet to the preheater, ° Fahr.	50	52
Temperature of the feed water inlet to the economizer, ° Fahr.	195	..
Temperature of the feed water inlet to the boiler, ° Fahr.	..	193
Boiler pressure, lbs. per sq. in.	100	103
Temperature of steam at the outlet of the superheater, ° Fahr.	561	594
Evaporation, actual total, lbs.	24,000	29,600
,, ,, per hour, lbs.	4,000	3,700
Equivalent evaporation from and at 212° Fahr., total, lbs.	25,368	31,346·4
Equivalent evaporation from and at 212° Fahr., per hour	4,228	3,918·3
Equivalent evaporation from and at 212° Fahr., including preheater, total, lbs.	28,968	35,668
Equivalent evaporation from and at 212° Fahr., including preheater, per hour, lbs.	4,828	4,458·5
Equivalent evaporation from and at 212° Fahr., including preheater and superheater, total, lbs.	31,800	39,812
Equivalent evaporation from and at 212° Fahr., including preheater and superheater, per hour	5,300	4,976·5
Heat recovered from waste gases and exhaust steam from turbine, therms per hour—		
Boiler and economizer	41·03	37 95
Preheater	5·79	5·21
Superheater	4·67	5 08
Total	51·49	48 24
Total equivalent evaporation per 100 lbs. of coal as received	53·37	50·11
Total equivalent evaporation per lb. of coke to furnaces	3·44	3·20
Heating surface of boiler, sq. ft.	2,470	2,080
,, ,, ,, economizer, sq. ft.		
Equivalent evaporation, lbs. per sq. ft. of heating surface per hour	1·71	1·88
Retorts in action	28	28
Coal carbonized = total, tons, calculated on basis of 3·8 tons per retort per day	26·6	35·467
Coal carbonized, lbs. per hour	9,930	9,930
Gas made, c.ft. (corrected), calculated on basis of 17,000 c.ft. per ton. Calorific value of gas, 450 B.Th.U.	452,200	602,939
Gas made, c.ft. (corrected) per hour	75,367	75,367
,, ,, therms ,,	339·15	339·15
Coke to furnaces, total, tons	4·122	5·55
,, ,, ,, per hour, lbs.	1,539	1,554
Steam to retorts, p.ct. of coal carbonized	23·3	23·3
Coke to furnaces, lbs. per 100 lbs. of coal carbonized	15·5	15·65
,, ,, ,, lbs. per therm	4·54	4·58
Analysis of waste gases at the inlet of the superheater—		
CO_2, p.ct.	12 08	12·42
O_2, p.ct.	8·35	7·82
Water vapour in waste gases at the inlet of the superheater—lbs. per 1000 c.ft. at 60° Fahr. and 30 in.	4·88	4·88
Total heat content of waste gases and water vapour at the inlet of the superheater—therms per hour (assuming 87·5 p.ct. of carbon in coke, and 20 p.ct. of carbon in pan ash from producers—*i.e.*, 85 p.ct. of weight of coke to furnaces = weight of carbon burnt)	80 92	79·30
Total heat content at outlet, therms per hour	26·3	34·0
Efficiency = $\frac{\text{Heat content of steam from boiler}}{\text{Heat content of water vapour and gases at the inlet.}} \times 100$	63 6	60·8

point on each machine, are factors which help to obtain most economical and efficient lubrication. Since the adoption of this system at Smethwick, the costs of lubrication have been reduced by 50 p.ct., notwithstanding the introduction of more plant and machinery. The reduction in costs of oil accounts for about 14 p.ct., so that the net reduction is 36 p.ct.

Coke Handling Plant.

A telpher conveyor constructed on the mono-rail principle was erected in 1922 to replace a worn out and obsolete pan conveyor, the repairs and maintenance costs of which had become prohibitive. A 3-ton telpher machine is electrically driven, the hoisting motor being 15 H.P., and the travelling motor 8 H.P. The track has been designed to allow of the transport of coke to the storage yard, carburetted water gas plant, or rotary screen. The track is 510 ft. long, at a height of 50 ft. above datum. The plant has now been in operation over 2½ years, and the costs for the twelve months ended Dec. 31, 1924, are as follows:

	Pence per Ton.
Interest and depreciation	5·5
Power (electric current at 2d. per unit)	0·5
Labour (1 driver per 8-hour shift, 80 p.ct. of time on telpher, 20 p.ct. of time on other work)	3·66
Maintenance and repairs—	
Repairs	0·33
Painting	1·088
Lubrication	0·017
	1·435
	11·095
Coke handled	32,200 tons
Average distance coke is carried	150 ft.

During the period under review the plant was not performing its full duty, so that the interest and depreciation cost is rather high. The cost of repairs and maintenance includes a set of new hoisting ropes, which usually have a life equivalent to handling 40,000 tons of coke. It will be seen that the painting item is also high, as the whole of this track, and the supporting trestles and girders, have been painted each summer since erection. This was deemed advisable, as the fumes emitted from some of the neighbouring works are highly charged with sulphur dioxide. It is hoped that annual painting of the whole of the track and trestles will not be necessary now that there is a good body of paint on the steelwork, and that only the portions subject to the abrasive action of the coke will have to be painted each year, the other parts being done every two or three years.

Examination of Plant and Records.

All the plant, machinery, and buildings are regularly examined and inspected, and the results reported in a special book. This work is divided between the foreman mechanic and the general foreman. By this means it is often possible to avoid breakdowns, and reduce the cost of repairs by having them carried out before the damage has gone too far. With the installation of modern plant and machinery, this regular periodical examination is essential for efficient and economic running. It is also important to keep a record of the working days of each part of the plant such as retorts, furnaces, carburetted water gas generators, carburettors, and superheaters; also boilers, gas engines, &c.

The thermal efficiency of coal gas production is calculated on the monthly results, and is graphically recorded together with the production of gas and bye-products and fuel consumption in therms. These graphs show at a glance the working of the plant, and amply repay the time involved in their preparation.

In conclusion I wish to acknowledge my indebtedness to my Chief, Mr. E. Hardiker, for his help and advice, and permission to present this paper to you.

Discussion.

Mr. J. H. Gee (Senior Vice-President) moved a vote of thanks to Mr. Currier, and commented on the wide scope of the paper. He would like to know what was the average ash content of the coal used at Smethwick. He thought the Gas Department of that town were to be congratulated upon the fact that 77·20 therms were made per ton of coal. He agreed as to the value of suitable mixtures of coal for the effective working of vertical retorts. The percentage of chlorides appeared to be on the low side. As to water softening, the nitrate of soda figure was in his judgment very high.

Mr. C. F. Tooby (Coventry Gas Department), who seconded the resolution, commented upon the importance of coal testing—always a difficult problem for works other than the very large ones, which were properly equipped. It had been mentioned that the settings were reconstructed on modern principles. Did this imply provision for securing bottom heating? Was the Smethwick method successful without getting excessive temperatures in the regenerators? As to liquor circulation, he agreed this was absolutely necessary to obtain proper freedom from pitch trouble.

Mr. L. H. Thomas (Past-President), who supported the vote, observed that, with regard to fixed ammonia, they had had quite satisfactory results at Nechells. The author had stated that no bars were used to remove the scurf from the retorts; the air being driven into the retort through several holes in the extractor casting. At Nechells they had occasionally to resort to the use of bars. In reference to the telpher for coke handling, the painting item was high. The electrolytic method of treating boiler feed water was very effective.

Mr. C. F. W. Rendle (Past-President, of Redditch) did not agree with the author's conclusions on the subject of lubrication. Mr. Currier favoured the system which provided for the supply of oils and greases over a certain period by one contractor at a rate per million cubic feet of gas sold. The amount of lubrication required on the average works ought to be small. By the exercise of care he had reduced the oil consumption at Long Eaton by 50 p.ct., while the make of gas had increased three-fold.

Mr. Currier replied to a number of the points raised in the discussion. The ash content in the coal used at Smethwick was 5·7 p.ct., while the highest chloride content was 0·1 p.ct., calculated as chlorine. They were determined to have a low chloride coal. No trouble from sludging in the economizer had been experienced. Though the plant had been reconstructed on modern lines, they had not bottom heating. He agreed that it was desirable to restrict to one man the adjusting of the dampers, but at Smethwick this plan was hardly practicable. Retort scurfing was done every five weeks. Theirs was a low throughput, and it was unnecessary to use bars. As to the painting work on the telpher conveyer, the columns had been concreted to a height of 12 ft. His view was that the cost of painting might be divided by three; the indications being that no trouble was likely to arise for three years.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Members of the Association met on Jan. 17, in the Bradford Corporation Gas Department Showrooms, Darley Street, to hear two papers. Mr. E. GILLETT (Bradford), the President, was in the chair. Mr. Jackson, one of the authors, was unfortunately unable to be present, owing to an attack of influenza, but he forwarded a number of copies of his paper. He expressed the hope that the contribution would be read on his behalf at the meeting.

The PRESIDENT said they were sorry to hear that Mr. Jackson was ill, and particularly so on the occasion on which he was to have given his carefully-prepared paper. This would be read by Mr. R. N. Webb, of Leeds (Senior Vice-President). As Mr. Jackson had kindly supplied copies for the members, it would be wise for the paper to be read and then more closely studied at leisure; the discussion being deferred to the February meeting, when it was hoped Mr. Jackson would be present to answer any questions.

This course was agreed upon, and Mr. WEBB then read the paper, entitled

THE VALUATION AND TESTING OF GAS COALS.

By F. J. JACKSON, of the Neepsend Gas-Works, Sheffield.

The distillation of coal is now regarded as a purely chemical process, and the gas-works of to-day plays the rôle of a huge laboratory. Yet, viewing our industry in this light, few can have a feeling of real satisfaction with the results obtained in our process of destructive distillation. Since the introduction of the Gas Regulation Act, the calorific value of every cubic foot of our main product is known to within 1 p.ct. accuracy, our tars (or tar products) are carefully examined according to the contracts we have entered upon, and the value of our liquor (or sulphate of ammonia) is very closely determined. The last-named provides us with perhaps the most striking example of the degree of accuracy we have set ourselves, for we submit to be penalized rather heavily should the acidity of our salt reach 0·03 p.ct.

These are the finished products of our chemical operations; but what of the raw material upon which the whole of these results depend? Conditions vary considerably on our respective works, but few (if any) of us can say to within 10 p.ct. what lies latent in the coal at our disposal. Until our position is strengthened in this direction, we cannot claim to be advancing on truly scientific lines. The industry has now become settled upon a calorific basis. Few could have imagined such a complete turn-over in so short a period; the transformation from illuminating standard having taken place smoothly and completely, in spite of the complexities that existed.

It is now within the realms of possibility that other fuels will be marketed on more scientific principles in the near future, movements having already shown themselves in several quarters. The blast furnace and coke oven industries have come to an agreement whereby coke is bought and sold on what really amounts to a "fixed carbon" basis; the coal world is already beginning to talk in terms of B.Th.U. and calories; and probably we may shortly have a pamphlet issued by H.M. Stationery Office on "The Prescribed Method of Coal Testing by the Coal Referees." It may fall upon the present juniors to voice the opinions of the gas industry when such a work is compiled. This is a situation which will confront us before many years are passed; to-day finds us unprepared, owing to the lack of standard methods of the estimation and valuation of coal.

In considering the scientific purchase of coal, we must bear in mind that the demand is from three main sources.

1.—Steam raising.
2.—Gas production and bye-product recovery.
3.—Domestic consumption.

The value of Class 1 can be said to be almost in direct proportion to the calorific value; and the same may to a certain extent hold good of Class 3, though in each case the ash content of the coal has considerable bearing on the matter. In Class 2, however—the one with which we are most intimately concerned—calorific value and ash content are not of first importance. What we require of a gas coal is:

(*a*) High yield of therms per ton.
(*b*) High yield of good-quality coke; and, to a lesser degree,
(*c*) High yield of tar.
(*d*) Good yield of ammonia.

Though at the present time standardized methods of coal testing are lacking, all but the smallest works adopt some comparative examination; it can truthfully be said that the colliery owners are equally unprepared for selling on any but the present unsatisfactory basis. Recently one of our eminent public analysts had a sample of coal sent to him from a colliery. It probably weighed 1 or 2 lbs., and the inquiry was for "a report on the value of this coal for gas making." The gentleman, somewhat perplexed, asked our advice. We told him to find the specific gravity, ultimate and proximate analysis, the dirt and sodium chloride content, and perhaps make a carbonizing test on (say) 10 grammes, and give as good a report as possible from this information. I think it is fairly generally agreed that, if an actual carbonizing test is not undertaken, all other information concerning the coal is interesting—perhaps a little useful—but only of slight value for gas making.

As far as outward appearances go, nothing is more deceptive than coal; even those with large experience in coal testing are able to say but little as to the gas-making properties until the material is put to actual carbonizing test—in fact, the more experienced the more reticent a man is to report until carbonizing figures are available. This is a matter which sometimes gives the works manager anxiety; for the stokers, having seen the coal elevated or conveyed, can in their ignorance attribute poor results to poor coal, while he lives in sublime ignorance.

If the highest plant efficiencies are to be attained, and if we are to be prepared to meet a new system of buying, our coal must be subjected to more severe tests than in the past, and this information applied (1) to draw comparison between quality and price when contracts are being made; and (2) to satisfy ourselves that contract conditions are closely maintained.

A complete examination of coal would entail the following work:

1.—Inspection on arrival at the works.
2.—Sampling.
3.—Proximate analysis.
4.—Ultimate analysis.
5.—Microscopic examination.
6.—Coking property test.
7.—Calorific value determination.
8.—Carbonizing test.

It is certainly a fact that we know far too little of the coals we carbonize; but at the same time it has to be borne in mind that coal testing is non-productive.

For work routine, (1) inspection on the siding, and (2) carbonizing tests should be systematically carried out, supplemented by proximate analysis and calorific value determinations when necessary. The microscopic and ultimate analysis can be dismissed from works routine and passed on to the research departments; but more attention will have to be paid in the future to the coking properties of coal.

As it was our privilege last session to have before us a very interesting paper on the subject of "Coal Testing," the writer on that occasion confining himself to laboratory examination, it is my intention to make but passing reference to these methods, and to place before you what I hope will be a few interesting figures from our experimental plant at the Neepsend Works.

EXPERIMENTAL PLANT AT THE NEEPSEND GAS-WORKS.

The coal on arrival at the sidings is inspected, and comment made, if necessary, on the screening, washing, and presence of foreign material. An occasional complaint to the colliery nowadays may receive more attention from them than in the past decade. Serious damage can be avoided in the coal breaking and coke screening plant by the elimination of metallic bodies while the coal is being emptied. I can assure you this is a real source of danger. We have quite an accumulation of "treasure" recovered before the coal is elevated, and we had the good fortune a short time ago to recover a blasting charge before it was able to cause trouble. The coals coming into the works are tested in rotation, due allowance being made for the size of the respective contracts. A wagon is taken at random, and an average sample of approximately 25 cwt. sent to the experimental works. From this a small average sample of approximately 1 lb. is taken for laboratory testing, and to hold a portion for future reference. The coal is then subjected to a carbonizing test, and examined in the laboratory according to particular requirements.

The plant consists of two regenerative settings of three Ω-shaped cast-iron retorts, 20 in. by 12 in. by 6 ft. 6 in., the weight of each retort being approximately 40 cwt. The mouthpieces are not of the self-sealing type, being fitted with lugs, cross bar, and screw for securing the mortar-luted lid. The ascension, arch, and dip pipes are 6 in. diameter and lead into two hydraulic mains—one for each setting. The seals are set and maintained at ½ in. (liquor being used). The offtakes are led into one common 8-in. foul main, each setting being adequately valved-off. The foul main is set at a gradual fall from the hydraulic main to the condensers, the liquid products travelling with the gas to this point. At the outlet a T in the main enables the gas to be passed to the purifying plant or to be diverted to the large works exhauster as required. The purifying plant comprises three water-luted boxes, 5 ft. by 5 ft. by 5 ft., filled with oxide of iron, and controlled by a Weck centre valve; no effort being made to extract ammonia after the condensers are passed. The test meter is of Braddock's wet type, of a capacity of 2000 c.ft. per hour. The holders are, of course, single lift, of a capacity of 3000 and 3500 c.ft. respectively, and counterbalanced to throw a pressure of approximately 3 in. A service is taken from the outlet of the holders to the laboratory, and passed on to the calorimeter (and photometer, if desired).

The plant is run completely on its own, with the exception of the week-end work, when the valve at the purifier inlet is closed and the plant is put on the direct pull of the works exhauster by the use of a water-seal box, thus enabling the purifiers to be opened-out. It is our custom to work two boxes on and one

off—each box being changed every third week-end. Syphons are fixed on the inlets and outlets of the purifiers and holders, and on the branch pull pipe to the exhauster. By periodical checks it is found that 1 p.ct. by weight of the coal used in the retorts is recovered from these syphons in the form of tar and liquor.

The total weight of the products of distillation is occasionally calculated, and found on the average to reach the high figure of 97 p.ct. of the coal carbonized—the 3 p.ct. loss being due to the elimination of ammonia and sulphur in the purifiers, the 1 p.ct. syphon condensate, and the unavoidable loss in charging the retorts and weighing the incandescent coke, &c. As the plant is run under pressure, leakage is much more easily detected. The whole plant up to the hydraulic main is thus tested daily; any backing of the meter caused by leakage being found when the retorts are empty, and rectified before testing is renewed.

Three separate tests are taken on each coal, the charge of 4 cwt. being distributed as equally as possible in the three retorts. A dummy test on 3 cwt. of the same coal precedes each accepted test, thus sweeping the plant of all gas from previous runs. The carbonizing period is six hours exactly, and only very rarely is the charge not completely burnt-off in this period. The two holders are used alternately for testing; the gas from one test is thus under laboratory examination while the next charge is being carbonized.

The tar and liquor are carefully collected in tared tins, and the coke when drawn is weighed in the hot state before quenching—the weighing machine being in the retort house. When the holder gas has been tested, the outlet is opened to the works exhauster, and in this way empties in readiness for the next test. The meter readings are taken every hour, and the temperatures of the condensers and meter noted.

TABLE I.—*Hourly Makes from Six Different Coals (Consecutive). C.Ft. per Ton*

—	A.	B.	C.	D.	E.	F.
1st hour . .	5,100	5,565	5,600	5,100	5,795	6,425
2nd ,, . .	2,375	2,930	2,940	3,100	3,040	2,775
3rd ,, . .	2,130	2,375	1,695	2,000	1,380	1,715
4th ,, . .	890	350	485	700	270	970
5th ,, . .	350	220	95	265	10	155
6th ,, . .	80	25	15	20	5	85
Total .	10,925	11,465	10,830	11,185	10,500	12,125

Below is a typical analysis of gas from the experimental plant:

CO_2 . .	3·1
O_2 . . .	*Nil*
C_nH_m . .	5·1
CO . .	7·0
H_2 . . .	45·1
CH_4 . .	36·8
N_2 . . .	2·9
	100 0

Inerts 6 p.ct.
Calorific value (calculated), taking C_nH_m as 2600 B.Th.U. per c.ft., 664 B.Th.U.
Actual, 653 B.Th.U. (corrected)

The temperature of the setting is closely maintained between 950° and 1000° C. (retort temperature), care being taken to see that this figure is not exceeded, due to the low melting point of cast iron (1150° to 1200°).

As before mentioned, three tests are taken on each coal (unless for any reason a test be spoilt, in which case another is put through—enough coal always being left for repeat tests). The yield of "therms per ton" does not as a rule vary more than 1 p.ct. in these three tests, and the average is accepted for that particular coal. Tests are tabulated and placed on record, and in this way we have at the works a complete record of all coals for the past 25 or 30 years.

The daily tests on the experimental plant are extremely useful, but probably the greatest benefit is obtained by a periodic review of the numerous coals.

In Table II. the results are given of five consecutive tests on "A" washed nuts.

TABLE II.—"*A*" *Washed Nuts.*

Date.	C.Ft. per Ton.	Calorific Value B.Th.U. Gross.	Therms per Ton.	Tar, Liquor, Coke per Ton of Coal.					Ash in Coke.	Sulphur in Coal.
		Correct'd		Lbs.	Lbs.	C.	Q.	Lbs.	P.Ct.	P.Ct.
April, 1923	10,850	656	71·2	145	182	12	3	9	8·2	2 5
Dec., 1923	10,905	650	70·9	145	165	13	0	2	6 5	1·3
Feb., 1924	10,892	630	68·6	118	162	12	3	10	8·2	1·5
Sept., 1924	11,077	630	70·0	130	167	12	3	17	6·1	1·4
Nov., 1924	11,155	630	70·3	128	167	12	3	12	8·8	1·4

These results are remarkable. Should a works be run on this coal alone, one could say with a certain degree of surety that a 70-therm coal was being carbonized. If at any period the make were to fall away, one would not be in any immediate hurry to attribute this to the coal, but would look further into the carbonizing process for the deficiency. Not only is this constancy noted in the gaseous yield, but the yield of tar and coke, and the ash and sulphur content of the coke, are such that one would almost conclude these tests had been carried out on the actual sample.

In Table III., however, we find totally different conditions.

TABLE III.—"*B*" *Washed Peas*

Date.	C.Ft. per Ton.	Calorific Value B.Th.U. Gross.	Therms per Ton.	Tar, Liquor, Coke per Ton of Coal.					Ash in Coke.	Sulphur in Coal.
		Correct'd		Lbs.	Lbs.	C.	Q.	Lbs.	P.Ct.	P.Ct.
Dec., 1921	11,097	634	70·4	85	123	13	2	8	10·6	2·1
July, 1922	11,135	584	65·0	60	133	13	3	0	16·5	1·7
Feb., 1923	10,910	621	67·8	132	140	13	1	13	7·3	1·8
Mar., 1923	11,065	630	69·7	80	158	13	1	16	9 0	2·1
May, 1923	11,842	591	70·0	103	92	13	2	13	7·8	1·6
une, 1923	12,003	598	71·8	85	117	13	1	23	8·2	1·9
July, 1923	12,032	578	69·5	133	113	13	0	12	7·0	1·7
Aug., 1923	10,905	608	66·3	115	132	13	2	25	7·6	2·3
Oct., 1923	10,782	601	64·8	77	137	13	1	18	11·0	2·0
Jan., 1924	11,440	608	69·6	83	127	13	0	27	7·7	1·8
Mar., 1924	11,455	607	69·5	78	158	13	1	18	8·0	1·8
Sept., 1924	11,817	599	70·8	88	152	13	2	25	6·3	1·5
Oct., 1924	11,715	618	72·4	107	123	13	2	21	6·6	1 9

The thirteen tests given here are consecutive, and cover a period of three years. The "therms per ton" vary from 64·8 to 72·4, the yield and sulphur content of coke are very uniform, but the ash varies from 6·3 to 16·5 p.ct. It may at this stage be useful to draw attention to the relation between the gaseous yield and the ash content of the coke, and to leave you to draw your own conclusions from the figures.

It can easily be seen from this tabulation that, in a works run entirely on this coal, the position of the works manager would be hardly as satisfactory as in the previous case. He may actually be running his plant at a greater efficiency when his reward is somewhere in the region of 65 therms per ton than at another period when his yield is 7 or 8 therms higher. He would hardly be inclined to attribute this irregularity to his coal, knowing that he was using the same class of coal day by day. It is indeed a business hunting for therms that do not exist, and it is equally tragic to feel one may be resting content with 65 therms when the means are available for a 73 therm yield.

It may be of interest to give you in Table IV. numerous consecutive tests on a screened coal—a coal which has been in use in our works for some considerable time.

TABLE IV.—"*C*" *Screened Coal*

Date.	C.Ft. per Ton.	Calorific Value B.Th.U. Gross.	Therms per Ton.	Tar, Liquor, Coke per Ton of Coal.					Ash in Coke	Sulphur in Coal.
				Lbs.	Lbs	C.	Q.	Lbs.	P.Ct.	P.Ct.
Feb., 1922	11,672	631	73 6	138	170	13	3	18	11·6	1·0
May, 1922	10,742	620	66 6	77	187	13	0	11	12·0	0·8
July, 1922	11,567	594	68·7	77	162	13	2	8	10·6	1 2
Nov. 1922	10,837	632	68 5	120	132	13	1	26	8·5	0·9
Feb., 1923	10.445	623	65·1	127	175	13	1	26	13·2	1·2
May, 1923	11,655	626	73·0	107	107	13	2	20	7·5	0·9
July, 1923	12,057	589	71·0	75	92	13	2	3	29·7	0·9
Aug., 1923	11,333	596	67·5	98	95	13	2	10	11·9	1·2
Sept., 1923	10,943	640	70·0	92	115	13	2	1	10·2	0·8
Oct., 1923	10,607	622	66·0	73	105	13	3	12	9·6	1·1
Nov., 1923	11,760	579	68·1	73	133	13	2	3	10·0	1·0
Jan., 1924	11,198	607	68·0	100	127	13	2	11	9·4	0 7
Feb., 1924	11,090	616	68·3	102	157	13	3	2	11·3	0·8
June, 1924	11,695	565	66·1	72	118	13	3	18	13·1	0·6
Aug., 1924	11,802	566	66·8	92	115	13	3	2	11·4	0·6
Oct., 1924	11,612	599	69·6	100	113	13	3	8	10·1	0·8
Nov., 1924	11,542	609	70·3	62	115	13	2	16	15·2	0·6

In a close study of this coal, the most striking feature is the remarkably low and constant sulphur figure. However, as distinct from coking practice, we should never condemn a coal on its sulphur content alone, provided it did not exceed (say) 3½ p.ct. The advantages gained by the low sulphur content of this coal are outweighed a hundredfold by the irregularity of the gaseous yield and ash content. May I again draw your attention to the relationship between "ash in coke" and therms—71 therms 29·7 ash, followed by 67·5 therms 11·9 ash, and this within a period of a few weeks? Imagine for a moment a small works run on this coal entirely, and having water gas plant in addition; the coal gas yield again will vary between 73·6 and 65·1 therms, and the water gas output will vary in proportion to the ash content of the coke, 7·5 to 29·7 p.ct.

This coal is one which is not at the present time living up to its reputation. Eight or ten years ago one could safely put it down as a 73 to 78 therm coal; this year 67 therms would probably be nearer the figure. This, however, introduces another matter. I have, for obvious reasons, not entered into the question of prices, and it may be the 67 therm coal of to-day is comparatively cheaper than the 75 therm coal of ten years ago.

COKE DISPOSAL.

It may at this stage be fitting to review the position of our industry with special reference to the disposal of the coke. Should the buying and selling of solid fuels follow closely on the lines of the Gas Regulation Act, a penalty clause relative to the ash content of the fuel would almost surely be considered.

What, then, would be the position of an undertaking using an class of coal as in Table IV.?

Assuming the coke from this coal to consist entirely of fixed carbon and ash, it would be no easy matter to make a comparison of the values of the coke with 7·5 and 29·7 p.ct. ash. The calorific values of the coke may be nearly in the ratio of 92 :70, but the question of freightage, handling larger bulks of fuel, and carting additional clinker, still further reduces the value of the high ash content coke. It can be fully understood, then, that the ash content of our coals is likely to be of considerably more importance than in the past—and particularly must we make sure that the ash from individual coals is maintained within narrower limits.

It is an extremely difficult matter at the present time to adopt any particular method of comparison of coal values in terms of sterling, due to the meteoric rise and fall in the market quotation of coal products; in more settled times, however, a system of valuation would not present such difficulties.

Older Comparisons.

The comparisons made up to this stage are the results of quite recent tests on the experimental plant, and since the introduction of the calorific standard. Although the majority of those present may wish to forget the illuminating power days, it may be of interest to the younger members to furnish the results of a few tests made when the quality standard was hanging in the balance, and illuminating power and calorific value estimations were both made. Therefore I give below the figures from three coals:

1.—"*D*" *Rough Slack*, 1917.

C.Ft. per Ton.	Illuminating Power. Candles.	Illuminating Power. Candles.	Sperm.	Tar, Liquor, Coke per Ton.		
		Corrected.	Lbs.	Lbs.	Lbs.	Cwt. Q. Lbs.
10,975	19·2	21·5	722	75	210	12 3 17
10,300	19·8	20 8	699	85	235	12 3 22
10,440	19·5	20·8	698	120	210	12 0 11
			706			

Average calorific value of gas, 603 B.Th.U.; yield, 62·95 therms per ton. Ash content in coal, 17 p.ct.

2.—"*E*" *Cobbles*.

11,740	19·0	22·8	765	105	190	12 3 7
11,645	18·8	22·3	751	105	195	12 3 17

Calorific value of gas, 617, 614 B.Th.U.; yield, 71·9 therms per ton. Ash content of coal, 11·9 p.ct.

3.—"*F*" *Slack*.

9530	18·4	17·9	601	90	215	13 1 6
9485	18·5	17·9	602	100	230	13 1 21
9650	18·3	17·9	605	90	230	13 0 19

Calorific value of gas, 579, 572, 574 B.Th.U.; yield, 54·9 therms per ton. Ash content of coal, 33·9 p.ct.

These were acknowledged at the time to be fairly representative of (1) average, and (2) and (3) extreme coals used on the works.

The end of the illuminating standard marked the disappearance of cannel from the gas-works, and I have purposely searched the records of 1898-1900 to be able to furnish comparisons between two of the cannels largely used at that time and an average bituminous coal of the same period.

1.—"*G*" *Nuts*, 1896.

—	Gas. C.Ft. per Ton.	Illuminating Power.	Sperm.	Tar.	Liquor.	Coke.	Ash in Coke.
			Lbs.	Lbs.	Lbs.	Cwt. Q. Lbs.	P.Ct.
July .	11,172	16·83	644	105	125	13 1 9	8·2
Sept. .	11,562	16·16	640	96	137	13 1 3	10·2
Nov. .	11,495	16·53	651	132	117	13 0 14	9·1
Dec. .	11,537	16·66	659	93	133	13 0 26	7·0

2.—"*H*" *Cannel*, 1900.

June .	10,643	21·86	798	228	216 7	11 0 11	12·4
Aug. .	11,149	20·39	803	188	225·0	11 0 13	15·4
Oct. .	10,730	22·09	813	222	215	11 0 3	12·2

3.—"*I*" *Cannel*, 1900.

Jan. .	10,328	19·40	687	179	250	10 3 23	17·1
March .	10,997	21·63	815	135	208	11 0 1	11·4
July .	10,460	20 5	735	146	225	11 1 27	14·1

From these figures you will agree that an experimental plant is a distinct asset to a works, but at the same time I know my superior officials are fully alive to the fact that, with the introduction of vertical retort practice, the actual yield of "therms per ton" on straight carbonization is not the only figure to be ascertained. The relative behaviour of coals as regards their passage through vertical retorts is a matter engaging our close attention at present; but owing to lack of experimental facilities, this is being done by careful observation of the actual works process. Perhaps at some future date the installation of a small vertical retort test plant may be justified.

In conclusion, I may add that, in addition to systematically examining the contract coals, this plant has been the means of obtaining exceedingly valuable information concerning the carbonization of mixtures of coal and pitch, peat, shale, and also the elimination of sulphur compounds.

I should like to express my appreciation of the facilities granted me by the officials of my Company in the compiling of this paper; and if any of the members would like to probe a little deeper into this subject they will have the opportunity later in the session, when, thanks to the kind invitation of my General Manager, Mr. Ralph Halkett, the Association will be visiting our Neepsend Station.

The President then called upon Mr. Wilson to read the following paper:

COMPLETE GASIFICATION—THE TULLY METHOD.

By J. Wilson, of Halifax.

The chief reason for the choice of my paper is my conviction that complete gasification is the ideal method of gas manufacture. It is pleasing to note that many gas engineers agree that this is the future method of manufacturing gas; and many have shown foresight in adopting complete gasification plant. It was obvious, three or four years ago, that the boom in coke and other bye-products could not last for ever, and that, whatever wonderful properties vertical coke possesses, it does not show them to any advantage when stored in a gas-works yard. The German Reparation Scheme has successfully closed all foreign ports to the export of British coke except at prices that scarcely pay for the loading of the trucks. These conditions may have a continuance for a few years. The question asked then is: What is to be done with the coke? There are two answers—manufacture carburetted water gas, or sell the coke at a low figure for export. In the former case there is a double loss of thermal efficiency. In the latter case the drop in the price of coke will have to be counterbalanced by a corresponding increase in the price of gas. Is that fair to the consumer? The answer is obvious.

The Halifax Tully Plant.

The equipment at Halifax consists of four Tully generators, each rated at 500,000 c.ft. per diem. Each unit may be worked by itself; but the Halifax plan of working is three generators under me—one actually gas-making, one standing off for clinkering, and one in reserve. The generators, starting from cold, are ready for gas-making in eight hours. Dry steam (superheated to 400° Fahr.) is admitted on both up run and down run through a 1½-in. pipe at 45 lbs. per sq. in. pressure. The blast is conveyed from De Laval blowers in a 12-in. diameter welded main. From the main each generator takes a separate supply of air. Each generator has two blast valves—namely, a 12-in. full-way valve used for admitting air into the bottom of the generator, and a 6-in. branch valve, known as the secondary air blast valve, which admits a certain amount of secondary air into the chequer work, to burn off any producer gas made by the main blast passing through the fire. The blower is capable of maintaining a pressure equal to a 20-in. water column when blowing on two generators at the same time. This is equivalent to nearly 20,000 c.ft. of air per minute.

The Tully plant is easy to operate. One man can control two generators without fatigue; but attention to the coal supply, clinkering, and assistance and relief of the operator, absorb the full time of another man. It is well to bear in mind, however, that both the operator and his assistant are more than semi-skilled, and carry out all running repairs and adjustments to the plant. The generator is charged through a novel and ingenious coal valve (the design of our Engineer) which preserves a clean gas-tight face, and maintains a regular feed of fuel.

Manufacture of Gas by a Tully Plant.

The first action, after the fire has been carefully clinkered, is for the operator to ensure that the up run and down run valves, blast valves, and the snift valve are in perfect working order. After this examination the coal feed is started.

1. The blower is then started, and the fire in the generator is blown for ten to twelve minutes. The blast is then shut off, and an up run put on for two minutes; the steam pressure being kept down to 10 lbs. The blast is again put on for six or seven minutes, then another two minutes' up run. This process is continued for four cycles, when the exit gases from the snift top are beginning to show colour. The generator is then ready for a regular cycle of work.

2. The following programme is adhered to until a temperature of 1100° C. is reached. One minute up run, one minute down run, half-a-minute up run, and a two-minute blow—making in all a cycle of four-and-a-half minutes. With this method a generator can be raised from 750° to 1100° C. in

one hour without any damaging effects on either grate bars or brickwork.

3. During the first hour after clinkering, coal is fed at the rate of 14 cwt. per hour until the generator is filled within 2 ft. of the coal valve, after which the normal feed of coal is admitted.

4. When the generator is at the required temperature, we settle down to fairly regular working. The main object is to keep the heat of the fire uniform throughout. While the fire is clean, it is possible to admit as much as 2000 lbs. of steam (superheated to 400° Fahr.) per hour, at a pressure of 50 lbs., without depreciating, to any large extent, the quality of the gas. It is, of course, necessary to reduce the volume of steam admitted into the generator towards the end of the eight-hour shift, to maintain a uniform quality of gas.

5. A very important point in the manufacture of gas in a Tully plant is the clinkering, which at Halifax is carried out in the following way. Four men, one at each door, are allowed one hour for clinkering the generator. Part of this time is occupied in actual work and part in rest. False bars, five in each door, are used to hold up the charge; and we find that less than one-tenth of the material removed is of a combustible nature, and even this has a calorific value of only 700 B.Th.U. per lb.

There have been many arguments as to the best cycle for working generators. At Halifax we have carried out a large number of experiments with various cycles, in an effort to obtain the best results in quality, yield per ton, yield per generator, and, of course, finally, therms per ton. These results may be of interest, and the following examples, which are typical, are submitted.

No. 1 Sample. Third Run after Coaling.	P.Ct.	No. 2 Sample. Third Run after Coaling.	P.Ct
CO_2	4·4	CO_2	5·8
CnHm	0·6	CnHm	0·8
O_2	0·6	C_2	1·0
CO	34·4	CO	32·4
H_2	47·3	H_2	44·0
CH_4	11·0	CH_4	7·2
N_2	1·7	N_2	8·8
	100·0		100·0
B.Th.U. (calculated)	396·01	B.Th.U. (calculated)	343·54
B.Th.U. (Boys)	394·29	B.Th.U. (Boys)	339·93
Cycle. 1 minute up run. 2 minutes' down run. 1 minute up run. 1 minute blow.		*Cycle.* 2 minutes' up run. 2 minutes' down run. 1 minute up run. 2 minutes' blow.	
Steam. 30 lbs. per sq.in.		*Steam.* 30 lbs. per sq.in.	
Blast, 20 5 in. (water).		*Blast.* 20·5 in. (water).	
Three hours after clinkering. Make per ton, 45,274 c.ft.		Three hours after clinkering. Make per ton, 55·318 c.ft.	

[Should anyone like further particulars of these analyses and tests, the author would be pleased to supply them.]

Before discussing the above tests, I should like to describe a trial test which was made to find how much gas one generator could produce. We used large clean South Yorkshire nuts, with an ash content of less than 5 p.ct. The two generators on test were newly clinkered. The steam was used at 390° Fahr. and 40 lbs. per sq. in. For three hours the two generators made at the rate of 1,500,000 c.ft. per diem; the calorific value being slightly less than 340 B.Th.U.

On another occasion we sought the highest calorific value per c.ft. of gas produced. The fires were again newly clinkered. The steam used had a temperature of 406° Fahr. and was injected at the rate of 1600 lbs. per hour at a pressure of 25 lbs. Under these conditions we made gas, over a period of one-and-a-half hours, of a value of 416 B.Th.U. per c.ft.

With the conditions under which the Halifax generators are worked, which normally produce a gas of only 340 B.Th.U. per c.ft., the highest thermal energy per ton of coal is obtained.

The experiments show (see previous analysis) that the best cycle is one minute up run, two minutes down run, one minute up run, and one minute blow. These short cycles, if carried out for any length of time, would tire the operator. They would only be practicable with mechanical or automatic control. We therefore have a limitation. One regular cycle is as nearly as possible the following: Two minutes up run, two minutes down run, one minute up run, and two minutes blow—a continuous cycle of seven minutes—with coal feeding at the rate of approximately 10 cwt. per hour.

Products of Manufacture—Gas.

When discussing the various properties of gas manufactured in a Tully plant, the first consideration is the coal. It must be a superior coal, one from which nearly 90 p.ct. of the weight may be recovered as volatiles. After continuous testing we found a good hard nut that answered these conditions. A laboratory analysis of the coal gives the following results:

	Wet Basis. P.Ct.
Moisture	7·4
Ash	3·3
Volatile matter (including water)	39·5
Free carbon	57·2 (calc.)
Sulphur	2·2
Iron	0 07
B.Th.U. (dry) per lb.	1340

The iron content is very low in this coal—an important point, and one often overlooked. The iron content of a coal is a big factor in the formation of clinker. The clinker formed with this class of coal is particularly soft, and is easy to knock off the brickwork of the generator. If steam is allowed to pass through the clinker in fairly large quantities for (say) half-an-hour before clinkering, the time occupied in cleaning the hearth is considerably reduced.

The gas is colourless, it contains traces of naphthalene, but is incapable of absorbing this compound. The average sulphur content is about 600 grains per 100 c.ft. The sulphur is mostly in the form of sulphur dioxide. Tully gas has rather a corrosive action on ironwork, especially in the presence of oxygen. Unlike carburetted water gas or blue water gas, it has no tendency to shorten the flame when mixed with coal gas. On the contrary, it increases the flame volume. Our motto is "where flame volume is right—all is well." The gas burns without any noise in a bunsen burner. Tully gas has a similar specific gravity to coal gas, and mixes thoroughly and quickly with it.

Bye-Products.

While theoretically there should be no bye-products from a Tully plant, beyond ammoniacal liquor, we get a very thick tar, which when distilled gives the following results:

100° C. water	1·0
170° C. light oil	2·4
230° C. medium oil	2·0
276° C. heavy oil	7·2
360° C. anthracene	28·6
Pitch (by difference)	59·8
	100·00
Specific gravity	1·225
Free carbon	26 0

Unfortunately, owing to the design of the plant, I could not get a true sample of ammoniacal liquor. I can only surmise that the ammonia content of such a liquor would be very low—the ammonia taking the form of one of the many ammonium sulphides.

Analysis of 24 Hour Test. One Generator.

Coal gasified	9 tons
Plant gas making	20 hours
Total amount of gas made	475,199 c.ft.
Gas made per ton of coal	53,911 ,,
Average B.Th.U. content of gas	340 00
Therms per ton of coal gasified	183·3

Average Analysis.

	P.Ct.
CO_2	6·0
CnHm	0·8
O_2	0·6
CO	31·3
H_2	43·8
CH_4	7·0
N_2	10·5
	100·0
B.Th.U. (calculated)	340·5

Cost of Manufacture.

With coal of the class previously mentioned, capable of producing 54,000 to 55,000 c.ft. of gas per ton, the cost of coal per 1000 c.ft. of gas made will be below 6d. in some cases, and a little over 6d. in works where railway dues are high. The Standard Industrial Council rates—viz., 10s. 10d. per shift—are paid to the operator and his assistant. Wages for clinkering (four men, one hour) are equal to half-a-shift—5s. 5d. Reckoning the steam costs as normal, we produce a gas which compares favourably in price with gas manufactured by any process.

Discussion.

The PRESIDENT, opening the discussion, said that Mr. Wilson was to be congratulated on his results. If he maintained these, he was doing exceedingly well. On some Tully plants there seemed to be an attempt to get too much out of them. The gas from them had been poor stuff, and the nitrogen content, which Mr. Wilson placed at 1 p.ct., was far above this—it was nearer 10 or 12 p.ct.—and the clinker was clinker and coal.

Mr. C. H. CHESTER (Wakefield) remarked that his experience bore out much of what Mr. Wilson had said. They must have a special coal. He had found the South Yorkshire (Bentley nuts) coal was good. The analysis Mr. Wilson submitted was almost identical with one he (Mr. Chester) gave in a paper last year. One little point seemed to have escaped Mr. Wilson's attention—the question of the treatment of coal to make it suitable for use in the Tully

plant. If they treated highly coking coal at about 450° C., it would lose its high coking power. If they had to be bound by one particular class of coal, and were going to instal Tully plants generally, the question of supply of suitable coal would be the biggest drawback, because they could not all get the particular coal which was most suitable. He had treated a Durham coal by slowing-up the rate of gas manufacture, and, by passing steam, had to some extent destroyed the coking properties. As to flame shape, he had not seen better lighting than with a 400 B.Th.U. gas with 80 p.ct. of Tully gas in it. The hydrogen content was rather low in Mr. Wilson's analysis. He (Mr. Chester) used to get up to 40 p.ct. of hydrogen. Mr. Wilson, he believed, gave the nitrogen at about 11 p.ct. Was not some of this due to a leaky secondary air valve? The amount of CO_2 should not be so high. A content of 3 p.ct. was to be expected with highly superheated steam. He had never found much ammonia in the liquor from a Tully plant. How did Mr. Wilson dispose of his tar?

Mr. WILSON said the average sulphur content was about 100 grains per 100 c.ft. In regard to Mr. Chester's suggestion as to leaky secondary air valves, to his (Mr. Wilson's) mind the blast valves on Tully plants were a weak feature. One did not know whether they were leaking or not. One could only find this out when the plant was not running. While the generator was under fire it was impossible to discover the leakage unless the CO_2 content in the gas came very high. Possibly the secondary air valve may have been weakened a bit. It was difficult to get rid of the tar. Much of it was used in the boilers.

Mr. CHESTER suggested that, by shutting down the blower in the middle of a run, one might find the cause of a high nitrogen figure. If it was the secondary air valve, there would be a smoky gas.

Mr. F. FIRTH (Leeds) could not make out how one would get a full flame on the constituents shown in Mr. Wilson's last analysis. On the first analysis he gave oxygen as 0·6 p.ct., and nitrogen, he believed, 1·7 p.ct. It would be impossible to have that figure of nitrogen with so much oxygen present. Mr. Wilson had suggested that Tully gas was incapable of absorbing naphthalene. After all, it was a gas, and under ordinary physical laws it would take up naphthalene.

Mr. WILSON said the nitrogen content had been estimated by difference.

Mr. J. B. BALMFORTH (Bingley) remarked that Mr. Wilson had not mentioned the idea of developing local sales of coke, especially with the smaller consumer. Personally, he did not think the Tully plant was the ideal, even if complete gasification was required. He thought the best form of gasification was on the system adopted at Harrogate. At what stage was the Tully gas mixed with the coal gas? Was it measured? If so, what type of meter was used?

Mr. WILSON suggested that the value of developing local coke sales was a debatable point. After all, a gas-works was intended to make and sell gas, and what coke could do, gas could do. In the matter of passing Tully gas into the ordinary gas, they had a choice of two ways at Halifax. They could meter it, or mix it with the gas in the foul main. Ordinarily they put it into the foul main, but on occasion—especially when they wanted some tests—they could pass it through a special Braddock meter.

Mr. BALMFORTH: You passed it through a set of condensers first, I suppose?

Mr. WILSON: Yes.

Mr. R. N. WEBB (Leeds): The figures you gave are measured figures?

Mr. WILSON: Yes.

The PRESIDENT: Do you get trouble in the foul mains when you are adding Tully gas?

Mr. WILSON: We have had the plant in four or five years now, and have had no trouble yet.

Mr. BALMFORTH, referring to Mr. Wilson's suggestion that leakage of the blast valves might be responsible for the high nitrogen content of the gas, said he did not know how the blast fan at Halifax was driven. If it was driven by electric motor, would it not be possible to stop the fan during the run?

Mr. WILSON said he believed that system was adopted at Colne. At Halifax they had a turbine on a continuous process.

Mr. T. G. LEWIS (Leeds) remarked that Mr. Wilson had referred to the action of Tully gas on iron work, &c. Was he referring to the gas in the crude form or after purification?

Mr. WILSON said the gas had a corrosive action on meter drums.

Mr. LEWIS said in that case it was a question as to whether any saving effected by Tully gas might not be counterbalanced by the cost of replacing services, and the expense of repair or renewal of meters, &c., owing to corrosion.

Mr. E. BAILEY (Cleckheaton) complimented Mr. Wilson on his paper. He had had experience of the Tully plant, and could bear out what Mr. Wilson said in regard to flame shape. It was certainly a good gas for incandescent burners. It affected meters rather severely. The meters he had in mind were made in 1915. After about three years, 50 p.ct. of them were passing unregistered gas.

Mr. CHESTER said he had found no extensive corrosion, but a drying effect on the leather of the meters. They had to lubricate them periodically to get over that trouble.

Mr. CHESTER moved a vote of thanks to the authors of the two papers, and also to Mr. Webb for reading Mr. Jackson's paper to the meeting.

Mr. FIRTH (Leeds) seconded the vote.

Mr. M'NAB, supporting the vote, expressed the hope of all the members that Mr. Jackson would have a speedy recovery, and that he would be fit to attend the next meeting and join in the discussion on his paper.

Mr. WILSON replied briefly.

On the motion of Mr. J. W. HOLROYD (Elland), seconded by Mr. SMALLEY, a vote of thanks was awarded Mr. Charles Wood, Engineer and General Manager of the Bradford Corporation Gas Department, for the use of the meeting room.

INTERNATIONAL COMMISSION ON ILLUMINATION.

(*Continued from p.* 152.)

RELATIVE VISIBILITY FUNCTION.

Dr. Crittenden then presented a paper on "The Relative Visibility Function," which had been written for the Geneva meeting of the Commission at the request of the Programme Committee, by Mr. K. S. GIBSON.

In the introduction reference was made to the paper given at the last meeting of the Commission on "The Relative Visibility Function and the Mechanical Equivalent of Light," which contained a brief résumé of the results obtained in the more recent and extensive visibility investigations. It was there noted that several determinations of this important function had been made by the flicker method, as against only one by the direct-comparison method; and that, because of the apparent differences in the values of relative visibility obtained by the two methods, it would be very desirable to have a new determination by the direct-comparison method made at the United States Bureau of Standards. Through the National Lamp Works of the General Electric Company, such an investigation has recently been completed by Gibson and Tyndall, and the results published in a Bureau of Standards scientific paper. The present communication discussed the bearing of these new data on the differences in relative visibility as obtained by the two common methods of photometry, and on the choice of standard average visibility data.

The average values arrived at by Gibson and Tyndall were compared with those of other investigators by means of fig. 5 and the table below.

*Values of Relative Visibility.**

Wave Length in Millimicrons.	Experimental Data.				Average Data.	
	Direct-Comparison Method.		Flicker Method.		I.E.S. Adopted Mean Values, 1918.†	Proposed Revision of I.E.S. Values by Gibson and Tyndall.‡
	Hyde, Forsyth, and Cady.	Gibson and Tyndall.	Average Aves-Nutting.	Coblentz and Emerson.		
400	0·00009	0·005	—	0·010	0·0004	0·0004
10	0·00062	0·012	—	0·017	0·0012	0·0012
20	0·0041	0·022	—	0·024	0·0040	0·0040
30	0·0115	0·033	—	0·029	0·0116	0·0116
40	0·022	0·043	—	0·033	0·023	0·023
450	0·036	0·051	—	0·041	0·038	0·038
60	0·055	0·069	—	0·056	0·060	0·060
70	0·087	0·103	—	0·083	0·091	0·091
80	0·138	0·143	0·152	0·125	0·139	0·139
90	0·216	0·196	0·225	0·894	0·208	0·208
500	0·328	0·318	0·339	0·316	0·323	0·323
10	0·515	0·523	0·527	0·503	0·484	0·503
20	0·698	0·732	0·721	0·710	0·670	0·710
30	0·847	0·878	0·865	0·862	0·836	0·862
40	0·968	0·964	0·953	0·954	0·942	0·954
550	0·996	0·998	0·995	0·994	0·993	0·995
60	0·995	0·991	0·994	0·998	0·996	0·995
70	0·944	0·947	0·950	0·968	0·952	0·952
80	0·855	0·863	0·875	0·898	0·870	0·870
90	0·735	0·754	0·764	0·800	0·757	0·757
600	0·600	0·634	0·636	0·687	0·631	0·631
10	0·464	0·511	0·505	0·557	0·503	0·503
20	0·341	0·389	0·378	0·427	0·380	0·381
30	0·238	0·279	0·271	0·302	0·262	0·265
40	0·154	0·184	0·171	0·194	0·170	0·175
650	0·094	0·1125	0·105	0·155	0·103	0·107
60	0·051	0·0642	—	0·0645	0·059	0·061
70	0·026	0·0349	—	0·0338	0·030	0·032
80	0·0125	0·0178	—	0·0178	0·016	0·017
90	0·0062	0·0092	—	0·0085	0·0081	0·0082
700	0·0031	0·0045	—	0·0040	0·0041	0·0041
10	0·0015	0·0022	—	0·00203	0·0021	0·0021
20	0·00074	0·00108	—	0·00097	0·0010	0·00105
30	0·00036	0·00051	—	0·00048	0·00052	0·00052
40	0·00018	0·00026	—	0·00028	0·00025	0·00025
750	0·00009	0·00014	—	0·00020	0·00012	0·00012
60	0·00005	0·00007	—	—	0·00006	0·00006

* Unity at wave length of maximum visibility.
† Maximum at 556 mμ.
‡ Maximum at 555 mμ.

The conclusion reached was that the values of visibility obtained by the flicker and the direct comparison methods do not certainly differ, provided the former is used under the adopted standard conditions, and the latter does not depart too widely from these conditions. In other words, a single standard visibility curve can represent the results obtained with the average eye by either method of observation, if limited to a small central portion of the retina with fairly high brightness of the photometric field.

Discussion.

Mr. WALSH, speaking on the question of the transmission curves of colour filters in heterochromatic photometry and for other purposes, said that Dr. Rayner, of the National Physical Laboratory, had made a definite suggestion that, if the work of the Committee was to be continued, it would be valuable if the present Commission

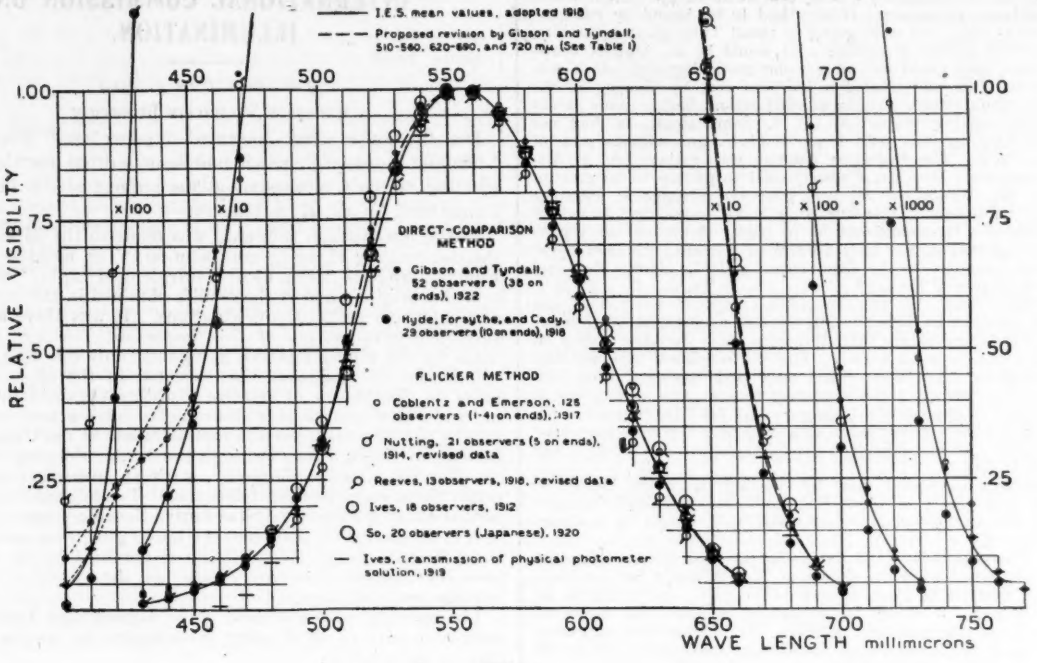

I.E.S. mean values, adopted 1918
Proposed revision by Gibson and Tyndall, 510-560, 620-680, and 720 mμ (See Table I)
RELATIVE VISIBILITY
WAVE LENGTH millimicrons
DIRECT-COMPARISON METHOD
Gibson and Tyndall, 52 observers (38 on ends), 1922
Hyde, Forsythe, and Cady, 29 observers (10 on ends), 1918
FLICKER METHOD
Coblentz and Emerson, 125 observers (1-41 on ends), 1917
Nutting, 21 observers (5 on ends), 1914, revised data
Reeves, 13 observers, 1918, revised data
Ives, 18 observers, 1912
So, 20 observers (Japanese), 1920
Ives, transmission of physical photometer solution, 1919
x 100
x 10
x 10
x 100
x 1000

FIG. 5.

would set-up another Committee to deal with that particular branch of the subject which had a bearing on other questions.

Mr. PATERSON proposed the following motion, which, after discussion, was passed: "That the Commission adopt at this session a provisional table of values for the visibility function, and request the Editing Committee to draw-up a suitable resolution, under the guidance of M. Fabry, Dr. Hyde, and Mr. Buckley, with power to co-opt."

M. JOUAST, Dr. HYDE, M. FABRY, Dr. CRITTENDEN, M. JOYE, and Mr. WALSH having discussed considerations connected with the Crova screen, the question of the desirability of dealing with colorimetry was introduced. M. Joye pointed out that physicists were not very far advanced in this subject. Mr. Walsh considered that it had, although still in its infancy, reached a stage at which some degree of international co-operation and agreement was desirable.

In the end it was decided to refer all questions relating to heterochromatic photometry to the present Committee, and to set-up a second Committee to deal with colorimetry, if deemed advisable.

M. JOUAST stated that, according to French legislation, standards were calculated on the basis of carbon incandescent lamps, but manufacturers were allowed to use a tungsten lamp. He had found great difficulty in getting a sufficient number of observers suitable for heterochromatic photometry.

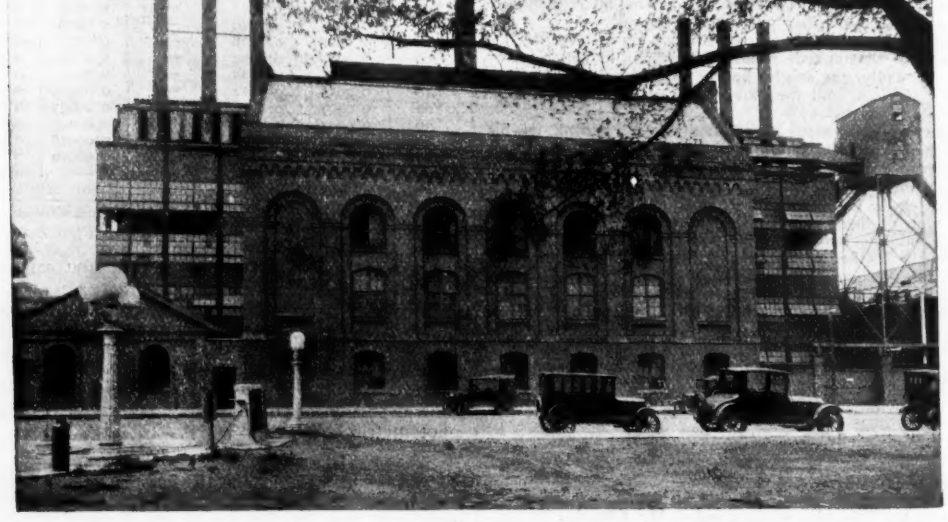
Dr. SHARP expressed the view that it was quite satisfactory to accept the Bureau of Standards results until a better value was known, but the main thing was that all vacuum standard lamps were measured on the same basis as gasfilled lamps by means of carbon lamps which had been compared among themselves, and thus the results are comparable with each other over an indefinite period of time.

Mr. WALSH and Dr. CRITTENDEN agreed that gasfilled lamps could not be depended upon to anything like the same extent as could vacuum lamps.

The CHAIRMAN (M. Fabry) thought the Commission might congratulate themselves that questions of photometry and pyrometry had made great progress in recent times. There was now a solid basis for photometrical pyrometry.

After agreeing upon the appointment of a Committee to study colorimetry, to be constituted at the concluding session, the Commission adjourned.

(To be continued.)



GLOVER-WEST VERTICAL RETORTS AT SPRINGFIELD, MASS.—*See opposite.*

GAS LIGHT AND COKE COMPANY.

Annual Report.

THE following is the report of the Directors of the Gas Light and Coke Company for the year ended Dec. 31, which will be presented at the Ordinary General Meeting on Friday, Feb. 6.

The accounts for the year show that, after paying in respect of the June half-year dividends at the rate of 4 p.ct. per annum on the 4 p.ct. preference stock, 3½ p.ct. per annum on the 3½ p.ct. maximum stock, and £5 6s. 8d. p.ct. per annum on the ordinary stock, and after contributing the sum of £20,000 to the redemption fund, there is a total available balance of £809,263 10s. 1d., out of which the Directors recommend the payment of the following dividends in respect of the December half-year: On the 4 p.ct. preference stock, at the rate of 4 p.ct per annum; on the 3½ p.ct. maximum stock, at the rate of 3½ p.ct. per annum; and on the ordinary stock, at the rate of £5 6s. 8d. p.ct. per annum; which, together with a further sum of £20,000 to be contributed to the redemption fund, will absorb £585,679 18s. od., and leave £223,583 12s. 1d. to be carried forward to the credit of the current year.

The sale of gas during the past year shows an increase of 6½ p.ct. There has been an addition for the year to the number of the Company's consumers of 15,016, and an increase of 85,322 in the number of gas stoves sold and let out on hire.

A Bill in Parliament has been deposited to provide for the transfer to the Company of the undertaking of the Brentford Gas Company, to confer various powers on the Company, and for other purposes. The clauses of the Bill will be explained to the proprietors when, in compliance with Standing Orders, it is submitted for their approval at an Extraordinary Meeting, which will be held immediately after the close of the Ordinary General Meeting on the 6th prox.

The Company joined with many other gas companies throughout the Kingdom and the Colonies in providing a gas exhibit at the British Empire Exhibition, 1924. This was one of its most successful features. The Company also provided a special exhibit of its chemical products.

DAVID MILNE WATSON, *Governor.*

Horseferry Road, Westminster, S.W. 1,
Jan. 26, 1925.

[Our customary details from the accounts will be given in the next issue of the "JOURNAL."]

GLOVER-WEST VERTICALS AT SPRINGFIELD

At Springfield, Mass., is probably the best-known of the Glover-West installations in the United States. Built in 1914, it forms a good example of the economical use of an existing site. At the time of its construction the coal gas part of the plant comprised six settings of inclined retorts, and at each end of the house there was available a space of 40 ft. into each of which three settings of eight Glover-West vertical retorts were built. The spaces were bounded at one end by a public highway and at the other by the main lines of the New York, New Haven, and Hartford Railroad.

The lay-out of the plant was necessarily somewhat cramped, and provided scope for some ingenuity in arrangement. Both the coal and coke are handled by a lip-bucket conveyor common to both batteries which the conveyor encircles; the lower strand having a "kink" in it to pass over the benches of inclines. A cross lip-bucket conveyor takes the coke to both a screening plant and yard storage, while the coal is fed to the conveyor in the usual fashion—*via* receiving hopper under the railroad track, feeder, and crusher. The flexibility of the wire-rope drive to the coke extractors is illustrated in this plant. One main driving gear controls all six settings, the ropes passing around the inclined retort stack.

Steaming of the coke has been practised there for as long as it has been the custom in England; gas of a calorific value of 510 B.Th.U. (gross) being made and mixed with carburetted water gas to bring it up to the State standards. That Mr. L. J. Willien was early in the field with the practice of steaming in Glover-West vertical retorts is proved by the fact that his first results were published in the "JOURNAL" for April 8, 1919. He was able at Springfield to convert a make of 12,300 c.ft. per ton at 540 B.Th.U. into 15,000 c.ft. per ton at 519 B.Th.U.; and he pointed out that this increased yield was obtained with practically no loss in coke. Of course steaming has been carried to much greater lengths since then; but these figures were considered remarkably good for the period, especially in view of the fact that the retorts and settings were in no way designed with these methods in mind.

The plant was built for the Chas. H. Tenney Company, of Boston, following the pronounced success of the plant at Fitchburg, since extended; and it is for this Company that a plant is under construction, and nearly completed, at Malden, Mass.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Gas Exhibit and Income-Tax.

SIR,—I hasten to advise you that my claim for our subscriptions' retention in revenue account for the purpose of computation of income-tax has been allowed. In fairness to the Inspector of Taxes, may I state that he did not *decline* to treat the amount as an allowable expense? A letter from him challenged it, but on my reply claiming it as legitimate expenditure it has been allowed.

R. LOCKEY.

Gas-Works, Morpeth,
Jan. 22, 1925.

Meters for Gas-Fires—Do They Require Stamping?

SIR,—This point is touched upon in my book on "Gas Meters" (p. 148); and, even though, as in your case, it is only an expression of opinion, it appears sound. The small charge of 1s. for stamping should not weigh very much where the credit of meters generally is concerned. It is more satisfactory for the retailer of gas to be above suspicion; and where meters fail, from any cause whatsoever, it is not easily forgotten. The industry suffers every day from the reputation of shoddy fittings; and shoddy meters would be bound to get on to gas-supply districts, if once it were recognized that verification was not necessary.

Everyone who has had any experience with the various forms of discount meters knows the trouble caused when they fail to register the amount used, especially when such meters run "neck and neck" with a master meter.

There is another aspect of the case. If a consumer takes gas from a statutory company, and doles it out through subsidiary meters to tenants, he becomes a gas seller, although the gas company have the monopoly in such matters. If such was not the case, then the large tenement dwellings in London, for instance, might instal a master meter, and reap a rich harvest for the gas consumed by the hundreds of tenants.

The various Acts state that all meters supplied or used *by undertakers* must be stamped, under penalty for non-compliance. There is nothing said as to making the use of meters obligatory. A statutory undertaking may contract to supply gas without a meter; but, if a meter is used, it must be verified by the Standards Department of the Board of Trade.

A. T. GILBERT.

Nuneaton, Jan. 26, 1925.

REGISTER OF PATENTS.

Burners.—No. 226,069.

VIDAL, A. E., of Gray's Inn, W.C. 1. (A communication from Selas Aktien, of Berlin.)

No. 4662; Feb. 23, 1924.

This invention relates to high-pressure gas burners, of the type in which a combustible gas or a mixture of air and gas under pressure is discharged through a nozzle comprising separate bores or circular openings arranged in a circle round the axis of the nozzle, into a mixing chamber; additional air being drawn in by the suction of the jets through passages communicating with the mixing chamber.

The object of the present modification is to provide a burner in which the flow of air into the space surrounded by the jets of gas or mixture is avoided.

The main claim is for: A high-pressure gas burner comprising in combination, a tubular member having an inlet for gas or gaseous mixture under pressure, a mixing chamber having inlets for air, a nozzle intermediate the inlet for gas or gaseous mixture and the mixing chamber, the said nozzle being provided with circularly arranged separate bores opening into the said mixing chamber in an appropriate position for drawing air from said inlets, and a closed body for filling the space surrounded by the jets of fluid discharged through the said bores.

Test Holders.—No. 225,602.

SIMPSON, S., of Newton Abbot.

No. 28,362; Nov. 10, 1923.

This invention relates to test holders for calibrating gas meters and for similar purposes, and has among its objects to provide an apparatus that is accurate and convenient in use.

The vertical movement of the bell is controlled by a central rod extending from the bottom of the tank to the usual cross bar or casting supported by pillars or standards. The lower end of the rod is preferably screwed into the bottom of the tank and held under tension by a nut at the upper end; or in some cases a bar or lever may be used having a set screw at one or both ends and engaging a groove or slot in the rod. A tube is carried from the top of the bell to a cross bar or frame at the bottom of the bell, and rollers are provided at the top and bottom end of the tube to engage the central rod and to guide the bell vertically. The rotation of the bell may be prevented by a guide or rollers engaging the gas inlet tube or a guide fixed to the inside of the tank.

The wheel carrying the bell and balance weights is supported by standards or bearings fixed to the upper cross bar; and where less than one revolution of the wheel is required it has two grooves formed in the periphery—one groove for the reception of the rope or chain supporting the bell and the other groove supporting the rope or chain carrying the balance weights. The ropes are each fixed at one end to

the wheel; or, in some cases, where more than one revolution is required, a continuous rope may be provided working in a spiral groove. The cycloid is preferably fixed to, or formed in one with, the balance wheel; and to enable the balance wheel to make one or more revolutions, the groove carrying the rope has, in addition to the cycloidal curve, extending from a central position towards the periphery, a longitudinal or spiral curve in the manner of a clock fuzee. The winch for lifting the pressure weight is preferably geared, and the pinion shaft may be disconnected when the weight is lifted; and in some cases a spring or counterweight may be provided to keep the rope in tension.

For the purpose of preventing corrosion of the scale by reason of contact with water in the tank, it may be attached to the upper part of the bell only, and may telescope into a tubular guide sealed at its lower end and fixed to the inside of the tank, or it may be carried in tubular or other guides fixed to the outside of the tank.

Elevation of Liquids.—No. 226,252

THE GAS LIGHT & COKE COMPANY, and PHILLIPS, J.M., both of London.

No. 18,183; July 13, 1923.

The invention relates to automatic control apparatus operated by a stream of running liquid. It can be applied to the automatic control of valves, electric switches, belt-shifting gears, &c., where periodic operation is required. In this specification, by way of example, it is applied to the automatic elevation of liquids which do not readily permit of being raised by the usual reciprocating or rotary pumps. In this application the liquid is elevated by the direct pressure or pulsation principle, in which the liquid is alternately admitted to a closed receptacle, and discharged therefrom, by means of compressed air or steam. The filling of the receptacle takes place through a self-acting check valve, while the discharge is effected by opening the valve that controls the pressure fluid supply. The liquid to be elevated does not come in contact with the operating mechanism, which may be fixed at any distance from the pulsation chamber.

Gas Burners.—No. 226,298.

KEITH, G., and JAMES KEITH & BLACKMAN COMPANY, LTD., both of London.

No. 23,960; Sept. 25, 1923.

This invention relates to gas and air mixing apparatus designed to meet the demand for the supply of a pre-formed self-burning mixture to a number of burners, as, for example, the burners of bread and biscuit gas-fired ovens. The problems to be solved are the protection of the parts of the apparatus and its surroundings from risks of explosion and consequences of possible explosion due to back-firing, for example, and automatic regulation of the quality, quantity, and pressure of the mixture to be supplied to the burners.

The gas and air may both be compressed, in which event separate compressing means are employed, so that no explosion of mixture can take place in the compressing apparatus. Desirably the pressures to which the two constituents of the mixture are brought exceed the pressure of the mixture. In order to obviate transmission of the force of any explosion of the mixture in other parts of the apparatus to either the gas compressor or the air compressor, non-return valves are fitted to the outlets of these compressors. The gas and air are led past the outlets through pipes to an injector. Either constituent of the mixture may be the injected medium. The injector nozzle is arranged in alignment with a Venturi tube in which the air and gas are mixed, and from which the mixture passes into a distribution chamber piped to the burners. The admission of air to the injector is controlled by a valve fitted to the compressed air supply pipe behind the nozzle. Between the compressed gas supply pipe and the Venturi tube is interposed a governor which regulates the pressure of the gas on its outlet side, so that it is equal to the pressure set up in a pipe leading from the governor to a point on the Venturi tube or to the distribution chamber. Fitted in the gas supply pipe between the governor outlet and the Venturi tube is an adjustable obturator, the adjustment of which determines the proportions of gas and air in the final mixture.

Gas Purifiers.—No. 226,364.

FLOYD, C. S., of Exeter.

No. 31,415; Dec. 14, 1923.

The purpose of the invention is to eliminate the strain on gas purifier sides caused by expansion of the oxide. It consists in a purifier so constructed that the grids do not extend across the full width of the purifier, so that a space may be left between the walls and the edge of the absorbent. At the same time it is ensured that no gas passes through the purifier without passing through the absorbent.

Gasholders.—No. 226,326.

WESTWOOD, W. W. S., of Stafford.

No. 27,407; Nov. 1, 1923.

This invention refers to spiral-guided holders. The holder is built up in the usual manner from a series of overlapping sheet metal plates which are riveted together at the overlap; the top row of the holder being formed from a gauge of sheet metal (say) $\frac{3}{8}$ in. thick, whereas the second and other hanging rows are formed from a much lighter gauge of metal (say) $\frac{1}{8}$ in. thick. At those sections of the periphery of the holder which are intersected by the spiral guide rails the second row is pressed or joggled outward until it is adjacent to the base of the rail. This outward pressure of the section also raises this part of that row into alignment with the periphery of the top row above it. Any intervening space which may obtain at the junction between the top and second row of the plates constituting part of the body of the holder at this point are filled in with a cement or other non-corrosive filling. By this means any pockets or recesses are avoided on the periphery of the holder behind the guide rails which would serve to retain moisture and set up corrosion. The holder is mounted in the ordinary way by means of flanged wheels upon the spiral guide rails.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 21.]

Nos. 867-1523.

BRITISH MANNESMANN TUBE COMPANY, LTD.—"Apparatus for testing pipe joints, &c." Nos. 1316, 1317.
BROWN, P. A.—"Carbonization of coal, &c." No. 1197.
BROWN, R.—"Control of automatic burners for cookers." No. 1365.
HELPS, G.—"Gas fires." No. 873.
JONES, F. W. SALISBURY-.—"Distillation of coal." Nos. 1093, 1094.
NIELSEN, R.—"Gasholders." No. 1084.
REWSE, H. S. SMITH-.—See Nielsen, R. No. 1084.
ROSS, D.—See British Mannesmann Tube Company, Ltd. Nos. 1316, 1317.
SUFFERN, E. S.—"Generation of gas." No. 958.
TAYLOR, F. A.—"Bunsen burner." No. 985.
TAYLOR, G.—"Safety guard for gas mantles." No. 1321.
WEISER, R. F.—See British Mannesmann Tube Company, Ltd. Nos. 1316, 1317.
WHESSOE FOUNDRY & ENGINEERING COMPANY, LTD.—See Nielsen, R. No. 1084.
WINZER, C. B.—See Brown, P. A. No. 1197

MISCELLANEOUS NEWS.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referees' reports of the official testings for the past quarter under the provisions of the Gas Regulation Act give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Brentford Gas Company.—501·9 B.Th.U. (declared calorific value, 500 B.Th.U.).
Commercial Gas Company.—480·2 B.Th.U. (declared calorific value, 475 B.Th.U.).
Gas Light and Coke Company.—501·9 B.Th.U. (declared calorific value, 500 B.Th.U.).
South Metropolitan Gas Company.—563·2 B.Th.U. (declared calorific value, 560 B.Th.U.).
South Suburban Gas Company.—487·1 B.Th.U. Oct. 1 to Dec. 14; 502·7 B.Th.U. Dec. 15 to 31 (declared calorific value, 480 B.Th.U. and 500 B.Th.U. respectively).
Tottenham District Light, Heat, and Power Company.—502·7 B.Th.U. (declared calorific value, 500 B.Th.U.).
Wandsworth, Wimbledon, and Epsom District Gas Company.—474·6 B.Th.U. (declared calorific value, 470 B.Th.U.).

BIGGLESWADE AND DISTRICT GAS ORDER.

An inquiry into the application for a Special Order by the Biggleswade and District Gas Company, Ltd., which was to have been held by Mr. H. C. Honey (Director of Gas Administration at the Board of Trade) last Friday, was cancelled.

Under the Order, the Company (which is non-statutory) ask power to purchase the statutory undertaking of the Ardsley and District Gas Company, and to extend the area of supply. A number of parishes which it is asked should be added to the area of supply are at present supplied by the Potton Gas & Coke Company, Ltd., the Sandley Gas Company, Ltd., and the Shefford Gas & Coke Company, Ltd.—all non-statutory undertakings—and the Order provides that the Biggleswade Company shall not supply in any or all these parishes until it has purchased the undertaking at present giving the supply.

The only objection which was raised was on the part of the Bedfordshire County Council, who sought a protection clause; but the parties having come to an agreement, the objection was withdrawn.

London County Council and Gas Legislation.—Reporting to the London County Council on Bills affecting the Metropolis to be promoted this year, the Parliamentary Committee make reference to those of the Gas Light and Coke Company and the South Metropolitan Gas Company. With regard to the latter, they say: "When the South Metropolitan Gas Bill, 1920, was before Parliament, a provision was inserted (section 27 of the Act) providing that the Company should, not later than the session of 1925, promote a Bill proposing a revision of the basic price of gas sanctioned in 1920, or giving an opportunity for such provision to be made, and that the Council should be entitled to be heard on the Bill. The agents for the present Bill have informed the Council that its promotion is intended to be a compliance with section 27 of the Act of 1920." The Committee's recommendation is that petitions be sealed and presented, if necessary, against both Bills.

THE ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.

Annual Meeting of Proprietors.

The Ordinary General Meeting of the proprietors of the Company was held to-day—Mr. R. W. EDWARDS (the Chairman and Managing Director) presiding.

THE LATE DEPUTY-CHAIRMAN.

The CHAIRMAN, on rising, said: Before submitting a copy of the statement of the Company's accounts for the year ended Dec. 31, 1924, and the accompanying Directors' report, which have been duly posted to all stockholders registered in the Company's books at the time of closing, I would invite you to pass from this meeting an expression of remembrance to our late Deputy-Chairman, Dr. Frederick Stroyan, J.P., who died on May 11, 1924. Dr. Stroyan was one of the most assiduous Directors any company ever possessed, insomuch that his interest was continuous, whether out and about upon his duties as a medical practitioner, or within the Company's works or offices—he had our interests always in the forefront. His death creates a gap, after so many years' association with this undertaking; and I ask you to rise as a token of respect to his memory, and as a confirmation of your desire that there be recorded in the Company's minutes an expression of appreciation of the services he rendered. Following the suggestion by a stockholder that a suitable record should be set-up to commemorate the memory of our late Chairman, Mr. W. T. Robertson—which was extended also to include a former Chairman, Mr. A. F. Wilson—these have been carried out, and are now exhibited here on the walls for your inspection, I suggest that a similar panel be designed and hung in memory of the late Dr. Frederick Stroyan. This is, perhaps, departing from the original idea, which extended only to past Chairmen of the Company; but as Dr. Stroyan was rather an exceptional personality, I feel sure it will be the wish of the proprietors to waive the rule on this occasion.

THE WAR AND AFTER.

Dealing now with our accounts and report for 1924, I would in the first place anticipate your permission to take the same as being read. At midnight of Aug. 4, 1914, this undertaking stepped out of the ranks of companies working under normal conditions, and entered the arena with those who, from that moment, devoted themselves primarily to the interests of our Empire. This Company's entire efforts were devoted to the prosecution of the war until after Nov. 11, 1918, when we reverted to our original category, with a view to recovering, so soon as circumstances permitted, the thread of progress and the position in the gas, water, and electricity industries to which we had intended that this undertaking should attain. It was a harder task—this post-war work—than were our war efforts, because there had been 4¼ years lost, during which time circumstances had entirely altered; and, moreover, we had during the war experienced exceptional and, one might say, artificial outputs, which were eliminated with the passing of the war, necessitating a retrogression, even to the point at which we left off in 1914. This was no easy task, for it meant breaking fresh ground; and as our works, plant, and staff were more or less fatigued by war efforts, it necessarily meant that some time must elapse before we could get the full grip of things. We are all aware of the disturbances and upheavals of post-war labour conditions, bringing with them strikes and other uncertainties. We had not only to stem a receding tide, but to recover, maintain, and promote a new stream of progress.

INCREASING SALES.

As the last wave of the ebb, we had to face some two years ago the loss of our South Aldershot bulk gas contract with the War Department. This, which represented in itself a considerable proportion of our gas output, was boldly met. During the year 1923 approximately 1000 additional gas consumers were put on our books, and, instead of experiencing a heavy loss in gas consumption, we had the satisfaction of recording a small increase, but gratifying, nevertheless, because it demonstrated that we were sufficiently resilient to meet and overcome one of the most supreme difficulties that we could have experienced, even under ordinary conditions. One penalty of taking large contracts is that, when they pass away, unless one is able at once to replace them with other business, recovery is sometimes slow and necessarily difficult. In our case, the wide district and its diversity of demand proved our salvation—in other words, we had a mixture of "swings and roundabouts." When we come on to 1924, our record has been even more gratifying, as over that period our number of gas consumers increased by some 1243, and our sales of gas advanced 12½ p.ct. This result is very encouraging indeed, in a year which was notable for its bad weather, and particularly mild autumn, because it shows that, under normal seasonal conditions, we could reasonably have expected a much larger increase in our sales. As a matter of fact, up to the autumn our sales were showing a very much higher ratio of increase, and it was the last two or three exceptional months which took off a certain amount of the gilt. Be that as it may, we must be satisfied, and look forward to better results when the seasons take their proper course, because there is no doubt that the gas industry is now supplying a demand which is going to be more than ever influenced by weather conditions. In our own experience, the number of cookers put out during 1924 was very much in excess of any previous year, while the number of gas fires is increasing enormously week by week; and these, together with the field of hot water apparatus, which is showing the greatest promise, point to the fact that, if the seasons get out of joint, the consumption of gas by these various apparatus will be considerably influenced. We hope, however, that as time goes on the public will be so educated that the gas stove will be the only means by which food is cooked, and that the wasteful idea of an open coal fire for heating rooms will be a thing of the past, and gas fires reign supreme. So many to-day are realizing that the use of gas for cooking, room warming, and water heating combines in itself a great solution of two modern problems—that of the domestic servant, and also the high cost of building. In the former case, reduced labour enables the middle-class to dispense with the extra servant; and, in relation to building costs, those who employ gas will be content with a smaller house, where, by the interchange of rooms, facilitated by the installation of gas fires, even the smaller house is automatically enlarged. Again, with such small houses, gas becomes doubly advantageous, when, in suitable weather, the family participate in outdoor sports, come in at a moment's notice, and are able to indulge in hot and refreshing baths. It is not an opportune moment to develop to any great extent these points, but one may be forgiven for taking advantage of it to point out, through the means of the Press, that there is much yet to be derived by the public from the use of gas, and the very efficient apparatus which is now being supplied by the various manufacturers. We ourselves are pursuing a most progressive programme. We have had for some years up-to-date showrooms installed in our out-districts, and we are now engaged in a house-to-house programme of canvassing. This is not only for the purpose of obtaining business, but in part a programme of education, and at the same time for bringing in to our sales department a record of the apparatus installed in each of the houses of our consumers, so that, by a scientific method of salesmanship, all these points can be ultimately developed in the use of gas to saturation point.

COAL AND RESIDUALS.

In the Directors' report reference is made to coal and residuals. These two are, in normal circumstances, more or less the determining factors in the cost of production. As you are well aware, about this time last year we were threatened with a coal strike, and as we had not too much coal on hand, it was necessary to supplement our stocks by purchasing in the open market, to a quantity of 4383 tons. Then, of course, our increased consumption of 12¼ p.ct. represents an increase in coal carbonized of about 4500 tons, and our contracts were subsequently renewed at an enhanced figure. These three factors have combined to produce our higher coal bill. Residuals have not been so buoyant as we have known them in recent years. Coke has been very dull, and at times has given us some apprehension as to its disposal. Prices are not comparable with last year, being at a lower rate. Tar had for some years been strong; but, owing to market conditions and the competition with bituminous compounds, there is no doubt that tar is to-day at a lower level, and I doubt if it will again reach the standard of the last few years, unless something very unforeseen takes place. One of the most important bye-products of tar is pitch, and that has dropped enormously during the last year. I think I am right in saying that, somewhere between twelve and eighteen months ago, the price was aspiring to 150s. per ton, whereas in November last it was about 40s., and to-day it is round about 50s. This lower price of pitch means that a larger quantity of tar is available for other purposes, and as one of these purposes is now being vigorously attacked by the vendors of bituminous compounds, the result has been a falling-down in the market prices. Notwithstanding this, I am very optimistic that the use of tar, either in a dehydrated form or mixed with a proportion of artificial bitumen (such as our "Tar-Umen" preparation), has a very big future in front of it for road-dressing purposes. Sulphate of ammonia has been more or less influenced by the greater competition which has arisen, not only in this country, but from abroad. There is no doubt that, as time goes on, synthetic ammonia will have an increasing influence in the markets for artificial fertilizers. In the net, coal has for the twelve months cost us an average of 30s. 0·77d. per ton, of which there was recovered from residual products 20s. 5·06d. (equal to 67·9 p.ct., as compared with 75·5 p.ct. for 1923). Hence you see my point that coal and residuals are at all times important factors in the cost of gas production. If we had had similar conditions to 1923, our profits would have been materially improved. It is not a bit of use, however, being faint-hearted; we have to meet circumstances and difficulties, and overcome them as they arise. There is no doubt that our gas department presents to-day a most encouraging picture, because, if any industry is now in full favour with the public, it is that of gas, for use both in home and factory. Although I am interested (in this Company) in the development of electricity, and shall have something to say about that department presently, I am sure the gas industry will not suffer so long as its leaders are enlightened in their methods and bold in the application of them. To pursue old-fashioned ideas, to tread the same rut from year to year, to hesitate to demolish obsolete plant, and replace with modern apparatus, is a sure and certain path to decay, and this term cannot be applied in any sense whatever to the gas industry as at present constituted.

THE GAS DEPARTMENT.

On the question of the gas department, I do not think I can very well add more, excepting to say that since 1921, when we obtained our Order under the Gas Regulation Act fixing the standard price at 1s. 5·4d. per therm, we have pursued a strong policy of reductions; and until Midsummer, 1924, when our home price had been brought down to 10·8d., we had scarcely missed one quarter during that period without a reduction in the price of gas. Unfortunately, then circumstances necessitated an increase in the price; but I am happy to say that we are overcoming those circumstances, to which I shall refer later, and it is our intention to reduce the price of gas, from the reading of the meters for Christmas last, to the consumers in the "A" and "B" areas by 1·4d., in the "C" area by 1·1d., and in the "D" area by 0·7d. Thereafter we shall hope to resume our procession of reductions at frequent intervals—a policy which, we believe, is greatly appreciated by the gas-consuming public.

WATER.

In this department the progress has again been modest, but quite satisfactory—26 extra metered supplies having been added. The expenditure on capital has been 1·2 p.ct. of the total expended for the twelve months. This department, as I have stated before, is one of our great assets. We are particularly proud of the services which we rendered during the war to the Aldershot Command and the public, and during times of drought and periods of upheaval—such as strikes and other unusual conditions—when we have met the demands without any disturbance or hitch whatever. We are also especially proud that there has been no alteration from the statutory domestic rates charged by the Company in pre-war days—notwithstanding the fact that there have been substantial increases in the cost. We have, by a policy of great economy, coupled with continuous house-to-house inspection, been able to obviate that; and it has also been facilitated by the loyal assistance of the public, who, particularly in recent years, have done all they could to keep their fittings in order, and to economize in the use of water. Many water undertakings have been compelled to increase their rates from 33 to 100 p.ct. During the year we have expended a sum of money in replacing one of our pumping sets, in No. 2 station. This set had been in operation nearly thirty years, and had borne the brunt of a great deal of the pumping during that time. We came to the conclusion that the best way to deal with it was to have an entire replacement of the important parts. In due course contracts were let, and the work has now been completed and the set is again in commission. Part of the expense is shown as "special purposes," and the balance will appear in the 1925 accounts.

ELECTRICITY.

This department, following such a notable progress as distinguished 1923 (representing 93·5 p.ct. increase), has during the past twelve months again shown an increase in the sales of 44¾ p.ct.—the number of additional consumers put on during the year being 161. You will agree with me that these large increases are very gratifying. In this department, which is developing satisfactorily, considerable extraordinary expenses were met during 1924, and these have somewhat modified our profits; but they were more or less, I hope, of a non-recurrent character. Notwithstanding this, the amount of profit earned, after providing for depreciation and special purposes, was about sufficient to meet the capital charges. We have in mind the future of this department; it is one which must ultimately play a large part in the affairs of the undertaking. I hesitate to say much more, because just now we are seriously considering how best its prospects can be developed. We are not unmindful of the fact that we are the only composite company undertaking possessing the three statutory powers, and it has ever been our wish that so far as possible each should be useful to the other. Like the water undertaking, we have kept within our pre-war statutory maximum prices for electricity; and during the last three years we have reduced the price to all consumers using current for other purposes than lighting by 33⅓ p.ct. In this department we have been threatened with unjust competition through the seeking of Parliamentary powers by a group of London electrical undertakings for supplying energy to various railway companies for use upon their systems for any purpose incidental thereto. Such powers would, of course, include the lighting and working of the numerous stations in this Company's statutory area, and we were obliged to contest the point. The London power companies had promoted two Bills, and as a result of our objections a satisfactory safeguarding clause was incorporated in one of these Bills. The other has gone before Parliament without inclusion of such clause; and we are, jointly with our friends and neighbours the Woking Electricity Supply Company, presenting a petition to Parliament for the incorporation of a similar safeguard in the second Bill.

THE CAPITAL ACCOUNT.

Contrary to my previous practice, I have left a point which has hitherto been more or less a preamble to my address, and that is the statement as to our capital. I am inclined to think that it is better placed in the concluding part, rather than in the earlier stages; otherwise one is likely to lose sight of its importance. For the three undertakings which I have illustrated, the total amount of capital authorized is £1,023,945, and of this there has been received £675,599 11s. 8d. Deducting £40,989 8s. 3d., added on consolidation under the powers of our 1909 Act, there remains a debit balance of £3559 4s. 1d. After allowing depreciation shown as £4231 19s. 3d., the net total sum expended is £638,169 7s. 6d., or £67,012 5s. 10d. expended in 1924. Of this sum, there was spent on the following departments:

	P.Ct.
Gas	75·1
Water	1·2
Electricity	23·7

and, again, further analyzing the expenditure under the heads of the various work:

	P.Ct.
New works	45·2
New mains	43·5
Meters	5·7
Machinery	5·2
Transformers, &c.	0·4

At the end of 1923 the total number of customers on our books was in the region of 24,000; the number is now approaching 27,000.

AGREEMENT WITH THE COUNCIL.

We must necessarily, of course, have a programme for new works, which has, unfortunately, been interrupted through circumstances to which I will now refer with as much delicacy as I can command. As mentioned in the Directors' report, the litigation which has for the past few years over-shadowed the Aldershot Borough Council and the Company has been now happily disposed of. I have thought a good deal about how much or how little I should, in justice to you and to the public, say about this matter. I have come to the conclusion, and I trust you will accept my decision, that it is not an occasion when the circumstance and detail of these unfortunate law cases should be discussed. If there had been in all the cases a decision of the Court, then I think you would have been entitled to a great deal of information; but of the three cases, one of two before the King's Bench Division was partially and the other wholly decided in Court, while the third case (in the Chancery Division) was never dealt with before the Judge. In the eventual composure, however, the three cases have been taken together, and a general agreement arrived at between the Aldershot Borough Council and your Directors. This agreement was the subject of careful consideration for some months, and I think I am safe in saying that the faithful interpretation of its provisions will be generally useful and beneficial to both sides. You cannot make omelettes without breaking eggs; neither can you indulge in law cases without having costs. We have met our costs, except a small balance of some £3000 odd to clear off this year, and then the book will be closed and placed in its order on the shelf, and, save as reference for those whom it may interest in years to come, I trust it will not be more than a historical record.

PROPOSED EXTENSIONS.

Delay, in consequence of these law cases, has necessarily taken place in the extension of our various works—particularly our gas production plant—because, until the composure of the litigation, we could not see our way to expend large sums of money on works situated in a district where we might possibly meet with subsequent difficulty. Now that the way is clear, we have come to the conclusion, and acted thereon promptly, that some of the work which we have in programme should forthwith proceed; and we are at present engaged in putting up a new retort house, which will be followed immediately afterwards by the reconstruction of another large house. For subsequent development later on, we have set-out a full idea of how we can utilize our North Works, Ash Road, so that the present horizontal retort system there, with coal and coke handling plant and machine stoking, can be employed to the fullest. As time goes on, and the demand increases, we have reason to believe that we can develop that part of our works to the extent of carbonizing between 700 and 800 tons of coal per day; and when that is filled-up, we have ample facilities on the South Works, Ash Road, and yet another excellent site at our Farnborough Works. You will therefore see that, from a gas point of view, the Company are in a magnificent position, and that what is wanted now is a real active development which will bring a full demand on our manufacturing capacity, and enable us to utilize our plant to its utmost, and thereby bring down in its proper relation our capital ratio of expenditure. Concentration of manufacturing resources has for some years been the slogan of our electrical friends, and there is no doubt the gas industry must adopt the same principle. Indeed, there will be two Bills before the next session of Parliament—promoted by the two largest undertakings in the country—the terms of which show a tacit acceptance of this creed. Following later, we have a pressing necessity for increased storage. It is our intention to reconstruct the gasholder at Fleet (which has at present a nominal capacity of 40,000 c.ft.), and enlarge it to nearly four times its size; and to put down an additional holder at Ash Road (on land which has been recently purchased and scheduled by Special Order under section 10 of the Gas Regulation Act, 1920) of a capacity of between 2½ and 3 million c.ft. We have also just completed new purifiers (four boxes), with a capacity of 3 million c.ft. per day, and there are numerous alterations and additions taking place in the subsidiary plant; so that you will see we have in front of us a very heavy and busy time. Our water-works are also being well attended to, in the completion of the plant to which I have referred. Our reservoirs and towers are in splendid condition, and an extension of our electricity department will follow so soon as we have decided upon the best course to pursue. Thus, in general, you will see that we have a very important undertaking on our hands, of the possibilities and ramifications of which we are fully conscious. As I said at the beginning of this address, the war took us out of the ranks of normal undertakings, and placed us among those who, for the period of the war, had to be more or less in the service of the country; so that we now hope that, after this period of post-war probation and examination, we shall have no further obstacles to overcome, but be able to pursue our proper and normal course in the development of our business for the service of the public. Thus shall we take our right place in the forefront with similar undertakings, and be justified in claiming that at any rate we are managing our business on the most enlightened basis and progressive principles. It is very gratifying to know that the last issue of capital—£60,000 of 4 p.ct. preference stock—was a considerable success, being substantially over-subscribed. After allowing for all expenses incidental to the issue, the capital was raised at about 5½ p.ct.

PERSONAL.

Before I move the resolution, there are two matters to which I should like to refer, of a more or less personal character. One is a word of welcome to our colleague Mr. B. R. Green, who, on the invitation of your Directors, filled the vacancy created by the lamented death of Dr. Stroyan. He will be a most valuable colleague. He will give us his best, and the advantage of his wide experience with other large and progressive undertakings. Then I should also like, by way of compliment, to remark how pleased we are that Mr. Braddock has accepted the position of Deputy-Chairman. He is no stranger; his work is known to many of the proprietors. Mr. Braddock is a man of considerable business capacity, as well as being an engineer; and his wide experience over different industries enables him to bring into our deliberations much valuable advice, which is of considerable benefit to our undertaking. As a concluding word, I should like to pay tribute to our excellent staff, who have again put their backs into the work with a view of submitting our accounts to you, and paying the dividends, as early as possible. On this occasion, we have beaten our own record for 1923, when our meeting was held on Jan. 31, 1924. We are now holding the meeting three days earlier, and I think we can rightly claim that it will be the first gas,

water, or electricity undertaking in Great Britain holding its annual meeting and paying its dividends (for the latter will be posted to-night) so early. It inspires the staff that their strenuous efforts are recognized; and I can assure you that the Directors appreciate very much indeed the high efficiency to which our staff has attained in this work—with particular reference to our Chief Accountant, as well as our Secretary (who has prepared the dividends), and to our Audit Accountant, who has the checking and verifying of multitudinous details of the accounts of the Company. I now formally move: "That the Directors' report, with the statement of accounts, for the twelve months ended Dec. 31, 1924, be and are hereby adopted, and that the dividends as therein recommended be and are declared to be forthwith payable to the proprietors."

The DEPUTY-CHAIRMAN (Mr. Thos. A. Braddock) seconded the proposition, which was carried unanimously.

Mr. B. R. GREEN was re-elected a Director and Mr. LIONEL MALTBY, F.C.A., an Auditor of the Company. A vote of thanks to the Chairman, Directors, and staff terminated the meeting.

BRIGHTON GAS COMPANY.

Annual Staff Dinner.

On Tuesday, Jan. 20, the Brighton Gas Company held their annual staff dinner and dance. Mr. C. H. Rutter, M.Inst.C.E., the Engineer and General Manager of the Company, presided.

Mr. J. H. INFIELD, in proposing the toast of "The Brighton and Hove General Gas Company," referred to the progress made by the Company since its inception a hundred years ago. People in Brighton and Hove, he said, perhaps did not fully realize what an important part of the life of the towns the Gas Company represented. There were over 1000 people in their employ; and there had been an increase of 130 million c.ft. in the output of gas last year. With regard to their employees, the Company, while providing pensions after certain periods of service, provided also a system of annual profit-sharing for those who regularly worked in the undertaking.

Mr. E. L. BURTON, Secretary of the Company, after making appreciative reference to Mr. Rutter, said he attached tremendous importance to co-partnership. It was intended that the co-partnership fund should be something in the nature of deferred life insurance and annuities, and that when a man who had stayed with the Company reached the retiring age he should be rewarded as highly as the Company could reward him. Joining at the age of 25, and retiring at 65, an employee who had been drawing £5 a week would have a pension of about £3 a week for the rest of his life. If he had left his dividends in the Company, he would also have something like £1300 or £1400 to his credit under the co-partnership scheme. The Company were on the best terms with the Corporations of Brighton and Hove and the other local authorities, accounted for by the sincerity and honesty of purpose of Mr. Rutter.

Mr. RUTTER said that to Mr. P. E. Browne, the Distribution Engineer, and to Mr. H. V. Corfield, Resident Engineer, Portslade Gas-Works, the thanks of the Company were due for all they had done during the year to promote the welfare of the Company. The increase of 130,000,000 c.ft. in the output represented roughly an increase of 6 p.ct., and this had meant additional work to both the engineering and the distribution departments. To the whole of his staff he tendered thanks, and finally he would mention Mr. Burton, who was indispensable to the Company in looking after their interests in London, and in carrying through all the arduous duties of Secretary.

MARKET HARBOROUGH GAS ACCOUNTS.

In his report for the year ended March 31, 1924, Mr. P. T. Harris, the Gas Manager of the Market Harborough Urban District Council, states that the expenditure was £17,375. The principal repaid on the loans amounted to £2025, as against £1507 in 1922-23, making a total repayment to March 31, 1924, of £24,884. The balance of loan now outstanding amounts to £50,435. The total expenditure on revenue account during the year was £16,875, and the income £21,825, leaving a gross profit of £4950, as compared with £4626 for the previous year. The gross profit is equal to 14·99d. per 1000 c.ft. of gas sold. After repayment of loans, &c., the net profit is £55.

During the year 6350 tons of coal were carbonized; this quantity being 150 tons greater than the previous year. The make of gas per ton of coal carbonized was 14,013 c.ft., as against 13,085 c.ft. in 1922-23—an increase of 928 c.ft. per ton. This increased make per ton is attributed to the greater yield of gas per ton of coal carbonized in the vertical retort installation. This plant was put to work on Nov. 15, 1923. The total make of gas was 88,986,000 c.ft., an increase of 9·7 p.ct. The percentage of unaccounted-for gas was 8·93. The receipts for coke, tar, and sulphate of ammonia were £3526, £1685, and £283 respectively, a total of £5494, as compared with £5458 in the previous year.

"Gas-Heated Hot Water Apparatus" was the subject of a lecture arranged by the Walsall and District Building Trades Guild, and given by Mr. Cobb, of Birmingham, at the Municipal Institute last week. The President, Mr. G. M. Wood, introducing the lecturer, spoke of the necessity of doing something to reduce the amount of smoke in towns, and said that the best way to tackle the nuisance was by a more extensive use of gas-heated apparatus. In his lecture Mr. Cobb pointed out how, with up-to-date appliances, the use of gas was safe, foolproof, and economical, as the gas-heated boiler required little or no attendance, the gas being automatically cut off as the water attained the required temperature. Various types of apparatus to meet different requirements were discussed.

GAS AND ITS MODERN APPLICATIONS.

This is the title of a lecture delivered by Mr. D. T. Livesey, Engineer, Manager, and Secretary of the East Grinstead Gas and Water Company, at a recent meeting of the East Grinstead Chamber of Commerce.

THEN AND NOW.

After tracing the beginnings of the gas industry, he compared the position of the industry in 1882 with that obtaining to-day. In 1882, he said, the capital invested was £50,261,000, while in 1923 it was £165,255,700. The coal carbonized in 1882 amounted to 7,280,700 tons, and the gas sold to 66,614,000,000 c.ft. The corresponding figures for 1923 were 16,460,600 tons, and 241,626,000,000 c.ft. Over 3000 distinct trades, each having an average of seven processes—in other words, 21,000 trade processes—are being carried out by the aid of coal gas.

THE REMEDY FOR SMOKE.

Mr. Livesey dealt at considerable length with the evil effects of polluting the atmosphere by burning raw coal. He drew attention to a leader in the "Times" for Jan. 12, which said that "in all sober truth, it should be every householder's duty to consider carefully how far it lies within his power to prevent an avoidable defilement of the atmosphere." The solution to the smoke problem lay in the more extended use of gas. When coal is treated at the gas-works, said the lecturer, 80 p.ct. of the possible heat of the coal is utilized as gas, coke, or tar, as compared with 20 to 60 p.ct. when used raw in domestic fires and manufactures. In 1922, the latest returns at hand, about 26 p.ct. of the coal raised was exported, 12 p.ct. used in gas-works and coke ovens, 3 p.ct. by electricity works, 15 p.ct. in domestic fires, and the balance of 44 p.ct. in manufactures and for other purposes. Millions of tons a year could be saved by the coal being first treated at gas-works; what now passes as smoke to pollute the atmosphere being collected as gas or tar and turned to useful purposes.

GAS LECTURE AT NEWPORT.

At a meeting of the Newport Rotary Club last week, Mr. J. H. Canning, Engineer and Manager of the Newport Gas-Works, traced the history of the gas industry, and dealt with its present work in promoting health and national economy.

EARLY DISCOVERIES.

About the year 1739, said Mr. Canning, Dr. Clayton, on distilling coal, discovered "a spirit he could in no way condense, but which caught fire at the flame of a candle, and burned brilliantly." These investigations appear to have had a singular attraction for Church dignitaries; for Dr. Watson, Bishop of Llandaff, in 1767 described the distillation of coal and the production of what he called "inflammable air." Mr. Canning then traced the progress of the industry which followed on the work of Murdoch, Lebon, and Winsor.

THE FINANCIAL ASPECT.

The gas industry of Great Britain, continued the speaker, employs about 150,000 men and £160,000,000 of capital. It treats about 17 million tons of coal a year, and sells its output of some 1400 million therms of gas to over eight million consumers. The industry is making regular and steady progress, as indicated by the following facts. In 1902 the sales of gas in Britain amounted to 160 thousand million c.ft. This figure had risen to 181 in 1907; to 205 in 1912; to 232 in 1917; and to 265 in 1922. This was an enormous output, but it was bigger still (274) in 1923; and the total for 1924 will be at least 285 thousand millions.

NEWPORT GAS COMPANY.

The Company was incorporated in 1843, and the business continued to increase until in the year 1881 the output of gas reached 80 million c.ft. per annum, and the existing Mill Street Works became inadequate. The Directors then secured the Crindau site, and the building of the Crindau Gas-Works was commenced in the year 1883. Steps were taken for the gradual transfer of manufacture to these more modern works; and in 1909 the Mill Street Gas-Works finally closed as a manufacturing station. The Company's business has continued to make steady progress, as is shown by the fact that in 1893 there were fewer than 4000 consumers, and that the make of gas was 231 million c.ft., while in 1923, thirty years later, there were 16,927 consumers, with a total make of 572 million c.ft.

British Industries Fair.

Optimistic views of a big trade revival in 1925 are strongly supported by the excellent prospects of the British Industries Fair, which takes place in Birmingham from Feb. 16 to 27. The range of goods is much wider than in any previous trade display; and more than 200,000 invitations have been issued to buyers at home and abroad. With the exception of two industries which have never taken part—textiles and finished motor-cars—every kind of British manufacture will, for the first time, be shown under one roof. Official interpreters have been engaged for the benefit of foreign visitors; and the descriptive catalogue, which is a valuable buyers' book of reference circulating throughout the world, is printed in three languages. Special railway tickets at a fare and a third for the return journey will be issued from every part of Great Britain. The City of Birmingham will hold carnival during the period of the Fair. There will be a series of civic receptions to exhibitors and buyers, and the Lord Mayor and Corporation will pay an official visit. The first two steel houses actually erected will form an attractive feature of the exhibition.

WELWYN AND HATFIELD GAS ORDER.

Mr. H. C. Honey (Director of Gas Administration at the Board of Trade) inquired last Thursday into an application by the Welwyn, Knebworth, and District Gas Company, Ltd., for a Special Order under section 10 of the Gas Regulation Act. The purpose of the Order is to amalgamate the Welwyn Company and the Hatfield Gas Company, Ltd., it having been found that this course will facilitate the giving of an adequate supply of gas to consumers on the Welwyn Garden City Estate, which is situated partly within the limits of supply of one Company, and partly within the limits of the other. Shares of the amalgamated Company are to be given in exchange for the shares of the Hatfield Company, pound for pound.

The promoters were represented by Mr. A. J. LEES (Messrs. Lees & Co., Parliamentary Agents); and the Welwyn Garden City, Ltd. (the only objectors present), by their Secretary, Mr. F. J. OSBORN. They asked for a lower standard price than was proposed by the promoters.

Mr. LEES said that soon after the registration of the Welwyn Garden City, Ltd., in April, 1920, for the purpose of developing the estate at Welwyn, it became apparent that something must be done to provide for the gas requirements of the area, and it was also obvious that the whole supply should come from the same source, rather than that the Welwyn and the Hatfield Companies should furnish gas separately in the two parts of the Garden City. It was arranged between the Companies in the first instance that the Welwyn Company should supply to the Hatfield Company in bulk for the purposes of the Garden City supply, and the bulk supply is at present being given. Later, however, it was felt that it was not entirely satisfactory that the area should be dependent on this bulk supply, and that the real solution of the matter was the amalgamation of the two Companies. The Welwyn Company was registered in 1912, with a total share capital of £12,000, of which £6000 was entitled to 10 p.ct., and the remaining £6000 to 7 p.ct. The borrowing powers obtained represented one-third of the paid-up capital. The maximum price fixed in 1912 was 4s. 4d. per 1000 c.ft. By a Special Order obtained in 1912, the share capital was increased by another £12,000, at 10 p.ct., and borrowing powers were increased to one-half the paid-up share capital—making the share capital £24,000, and the borrowing powers £12,000. The maximum price was then fixed at 1s. 6d. per therm. The Hatfield Company was registered in 1888, with a standard price of 4s. 3d., and an authorized capital of £3000 at 10 p.ct. and £7000 at 7 p.ct., subject to the operation of a sliding-scale. Borrowing powers were one-quarter of the paid-up capital. The slide was 5s. for each penny increase or decrease in the price of gas, in the case of both classes of capital. By a Special Order in 1923 they were authorized to raise additional capital of £20,000, with a standard dividend of 7 p.ct., the slide being the same as previously. Borrowing powers were increased to one-half the paid-up capital. In 1921 the standard price of the Hatfield Company was fixed at 18·2d. per therm. Up to date, the Welwyn Company had raised £17,088 of their authorized share capital, of which £16,000 was entitled to dividend; the balance of £1088 being premiums. The total share and loan capital raised was £19,596, leaving still available £16,404. The Hatfield Company had raised by shares £18,893, leaving £11,107 unissued. Redeemable debentures had been issued to the extent of £7982, leaving unissued £7018. The two Companies thus had an available capital of £34,529. At the time of the application for the present Order, both Companies were supplying gas at 15·6d. per therm, but the price had since been reduced to 15·2d. It could not have been contemplated, in 1921, when the bulk supply main was laid, that by 1924 the Welwyn Company would be supplying 50 p.ct. more gas than the quantity provided for in the agreement; and the rapid development of the Garden City called for prompt action.

It was hoped to effect the amalgamation on April 1 next. Power was sought by the Welwyn Company to take over, in addition to the Hatfield Company's area of supply, the parish of Essendon. This parish was included in the Hatfield Company's area in 1888, but the Company had not supplied there within the time limit given, and their powers had lapsed. No objection was raised against the Welwyn Company taking over this parish. The holders of ordinary and preference stock in the Hatfield Company were to receive an equal amount of ordinary and preference stock in the amalgamated Company, at the same rates of dividend. There was no question of compensation to Directors, and it was proposed that the three Directors of the Hatfield Company should become Directors of the amalgamated Company.

The only compensation proposed to be paid under the Order was £800 to Mr. A. D. Cromarty (the Secretary of the Welwyn Company), in respect of loss of office. This was equal to five years' remuneration. Mr. George Evetts (the Consulting Engineer to the Welwyn Company) proposed to retire without compensation. The Order provided that the limitation of the share capital of the Welwyn Company imposed by the Order of 1921 (£24,000) should not prevent the Welwyn Company from creating the share capital to be issued to the holders of ordinary shares and preference stock of the Hatfield Company, amounting to £17,903 odd, or from raising new capital not exceeding £30,096 odd—provided that the total share capital of the Welwyn Company should not exceed £72,000. Borrowing powers were limited to one-half the paid-up capital, and the rate of interest to 6 p.ct. on money borrowed after the date of the Order. It was proposed that the dividends payable on the capital already issued should remain as before, and that on preference and ordinary shares issued after the date of this Order the standard dividend should be 7 p.ct. As to standard price, it was proposed that this should be 16d. per therm over the whole area, in place of the existing 18d. maximum in the Welwyn area, and the 18·2d. standard in the Hatfield area. The slide was the usual one of 5s. p.ct. in respect of every one-fifth of a penny per therm increase or decrease of the standard price. It was explained that the present Hatfield 7 p.ct. shares were on the 5s. slide, and, in order to save having two different classes of 7 p.ct. shares, one carrying a 5s. and the other a 3s. 6d. slide (which latter, under a previous Welwyn Order, was to be the slide if the Welwyn Company adopted the sliding-scale), it was proposed that the whole of the 7 p.ct. capital should carry a 5s. slide.

Mr. HONEY said it was provided in the previous Welwyn Order that if the sliding-scale were adopted by the Welwyn Company the slide on the 7 p.ct. capital should be 3s. 6d. If the agreement between the two Companies was that the holder of Hatfield shares should have the equivalent amount of Welwyn shares, surely he had agreed to accept the lower slide.

Mr. LEES pointed out that it was part of the terms of the agreement that the Hatfield shareholder should have the 5s. slide in the Welwyn Company. If, however, Mr. Honey had any doubt with regard to this matter, perhaps it would be better for the amalgamated Company to put up with the inconvenience of the two slides. The Order authorized the erection of new works on lands in the parish of Welwyn Garden City. The situation was convenient, and there was no opposition. The limits of supply of the two Companies were within the areas of five different local authorities. Only one had sent in any objections to the present application—namely, the Hitchin Rural District Council. Three parishes of that rural district were supplied by the Welwyn Company; and apparently it was thought that if the Welwyn Company went on alone, those parishes might get a cheaper supply of gas than they would if the two Companies amalgamated. The Council did not appear at the inquiry, however, to support the objection, and had left the matter in the hands of the Board. They appeared to think the people who would gain by the amalgamation would be the residents of Welwyn Garden City only.

Mr. HONEY thought their main object was to get a satisfactory standard price.

Mr. LEES said the only objectors there were the Welwyn Garden City, Ltd., though it was chiefly for the benefit of consumers in the Welwyn Garden City that the amalgamation was proposed. The real objection was that the standard price was too high, it being suggested that the present selling price of 15·2d. per therm should be the standard.

Mr. *George Evetts* (Consulting Engineer to the Welwyn Company), in evidence, said the portion of the Garden City already developed was almost entirely in the area of the Hatfield Company. He produced a table showing the growth of consumption from 1912 onwards in the Hatfield and Welwyn areas, exclusive of the Garden City, and in the Garden City itself. In 1924 the approximate consumption in the Hatfield district was 18·5 million c.ft., in Welwyn 20 millions, and in the Garden City 10·5 millions. Nearly all the houses in the Garden City (there were about 800 at present) were supplied with gas for heating and cooking, and a few for lighting. Future development promised to be fairly rapid, and a sale of 13 million c.ft. was anticipated in the Garden City in 1925. In 1922 it became obvious to the Directors of both Companies that neither of the existing gas-works was capable of economic development in order to cope with the Garden City requirements for many years ahead, and that it would be unsound to develop works at the extreme north and south of the combined area (where they were at present situated) when the maximum requirements were likely to be in the centre. The Welwyn Company had laid a special main from Welwyn to the Garden City, and had installed a small booster; and recently the Hatfield Company had laid a 6-in. high-pressure main, and had installed pressure-raising plant at Hatfield, with reducing governors at the Garden City. So that at present both Companies were supplying the area. Further storage would be necessary very shortly, and a holder was to be constructed on the new site. The capital expended by each Company was not unreasonable, having regard to the sales, but the development of the Garden City had resulted in a heavy burden of expenditure which would not be fully remunerative for many years. The figures were as follows.

Capital Expenditure per Million C.Ft. Sold.—Approximate Figures.

Year 1924.	Expended.	Sale.	Expenditure per Million.
	£	Millions C.Ft.	£
Welwyn, *ex* Garden City . . .	16,300	20·0	815
Hatfield " " . . .	11,229	18·5	607
Welwyn Garden City " . . .	28,126	13 0*	2305
	55,655	51 5	1086

* Estimated sale for 1925.

Certain adjustments of these figures must be considered in dealing with the future. The expenditure on Hatfield represented the end of a phase of growth without much expenditure, and a phase of expenditure would be necessary in any case. The same applied, to a lesser degree, in Welwyn. Further, the Garden City expenditure was on a post-war basis, and, when the new works were built, the connecting main and boosting plant should be rightly debited to the old undertaking rather than the Garden City portion. There was still, however, a wide margin, and the figure of £2305 showed what post-war development meant. No storage came into this; the manufacturing plant only being added as complementary to existing works. For the new works, £39,200 was required, of which it was hoped £8000 could be allocated to revenue, leaving £31,200 for capital. The proposed works would be for a 92 million c.ft. production, or (say) 83 millions sale, compared with the estimated 1925 sale of 52 millions. The gasholder would be built first, costing £8700, and holding about 270,000 c.ft. There was little doubt, therefore, that the capital would be expended in less than ten years. It would be undesirable to have two classes of 7 p.ct. stock in a small undertaking of this nature, and he was of opinion that it was within the province of the Board to make the suggested alteration of slide from 3s. 6d. to 5s., the effect of which on the consumer would be almost negligible. If the whole of the further additional capital to be raised were issued at 7 p.ct., and the stock did not fetch a penny more in the market, the extra dividend required would be £32 per annum, including the exist-

ing capital. This was the worst that could happen; and based on a sale of 90 million c.ft., the cost of the proposal to the consumer was one-twelfth of a penny per 1000 c.ft. As to the standard price, the Hatfield shareholders, with a standard of 18·2d., would be entitled to 15 increments of dividend on the present selling price of 15·2d., and a revision was necessary. The present dividend requirement at standard and maximum rate had been increased by the post-war development and the Garden City growth. In December, 1921, the total capital was £25,400 for 33·1 million c.ft. sales (£767 per million), and the dividend and interest required amounted to £1940, or 14d. per 1000 c.ft. At present the requirements, on the basis of 51·5 million c.ft. sold in 1924, amounted to £3980, or 18·6. per 1000 c.ft. Therefore each £100 per million increase in the capital expenditure added 1·5d. to the dividend and interest requirements. When the new works were built, and the Garden City developed, the capital expenditure was estimated to reach £110,000, or £1325 per million c.ft., and the interest and dividend charges would then amount to £7600 a year, or 22d. per 1000 c.ft. There was no prospect of a drop in the meantime. He had worked out the requirements up to the time that both existing works were developed to the fullest extent, and the sale increased accordingly; and the capital cost was then 18·6d. per 1000 c.ft. So that in no period during the transition and the erection of the new works would the capital charge be lower than 18·6d. The proposed standard price was not unreasonable. The objection of the Garden City to the selling price seemed unsound, in view of the fact that it was for the specific purpose of benefiting the residents in the Garden City that the heavy capital expenditure had been incurred, and further capital expenditure was still necessary. It had been stated that economies should follow amalgamation; but in view of the commitments, the present price of 15·2d. could not be further reduced. The amalgamation would prevent a further increase in the price of gas which would have been necessary, due to the development of the Garden City, had the Companies remained separate. With the two Companies amalgamated, the capital would be £1086 per million. Had the whole of the expenditure been incurred by the Hatfield Company, it would have been approximately £1250 per million; and this would have added about 2½d. per 1000 c.ft. to the price of gas. He had based his figures on the assumption that there would be an increase of 500 consumers in the Garden City during the next ten years.

Mr. OSBORN pointed out that there would be at least 500 houses built in 1925.

Witness said that, if the figures submitted by Mr. Osborn were right, which would mean that the Company would get, within the next ten years, another 30 million c.ft. consumption from the Garden City, with an additional expenditure of £36,000, this would have the effect of reducing the capital expenditure of £1325 per million to £1290.

A discussion then arose between Mr. Honey and Mr. Evetts as to the dividends paid by the separate companies, and the position which would arise if the Hatfield Company alone had to expend the capital to enable them to supply the requirements of the Garden City.

Witness suggested that, owing to the large capital expenditure which would be involved, and its effect upon dividends, the standard price might have to be revised.

Mr. HONEY asked whether the position would not be that, until the capital again became remunerative, the dividend on the Hatfield Company's shares would have to drop? Was Mr. Evetts assuming that the standard price should be increased if a company had to expend a good deal of capital, in order that the dividends under the sliding-scale should not drop?

Witness said he was, in a special case of this sort. Otherwise, the position would be hopeless. This Company would have been better off to-day had the Welwyn Garden City developed their own gas undertaking in their own area.

Mr. LEES said the Welwyn Garden City had at one time contemplated the establishment of their own undertaking. They had been advised on the matter, and having got an estimate of the cost, begged and prayed Mr. Frank Jones (the Chairman of the Welwyn Company) to give a supply.

Mr. *Frank Jones* corroborated this, and said that having been pressed so much in the past to give a supply, he was surprised to find the Welwyn Garden City at the inquiry at all. He and the Directors of the two Companies had been to much inconvenience and had spent a great deal of time in putting this matter on a proper footing in order to help the Garden City. Had the Gas Companies known that the Garden City would not support them, they would have left the Garden City alone, and gone on paying their 10 p.ct. dividends. The attitude of Garden City was most unfair.

Mr. OSBORN said he was not present to make an attack on the Gas Companies, but simply to put forward the view of the Garden City Company. By the agreement in 1921, under which the Gas Companies laid their mains for supplying the estate, the Garden City Company had undertaken, for a maximum period of seven years, to pay 7½ p.ct. per annum on the capital required by both Companies for the initial extension works, estimated at £6000, less 1s. 6d. per 1000 c.ft. on the gas consumed in the area. Payments were made under this agreement in 1922 and 1923, but by 1924 the demand had exceeded 6 million c.ft. per annum, and no further payments were due under the agreement. He mentioned this in order to point out that the Garden City Company had taken the initial risk in carrying the development into the Garden City. It was agreed that the amalgamation of the two Gas Companies was desirable, on the grounds of the increased efficiency and lower working costs that should result; but it was submitted that the consumers should obtain the advantage of such economies in an immediate or prospective reduction in the price of gas. During 1923 and 1924 the price charged was 15·6d. per therm; and this had proved amply remunerative, despite the fact that large capital expenditure was incurred in 1922 and 1923 which was not yet fully productive. Both Companies were more than meeting their interest and dividend payments, and were carrying forward substantial balances on profit and loss account. The chief items of heavy capital expenditure in supplying the Garden City had already been incurred—namely, the laying of high-pressure mains for the long distances from Welwyn and Hatfield to the Garden City. Distribution mains also had not hitherto been fully productive, and future development would give a bigger consumption for a given length of main. Development in the Garden City was occurring in compact areas. It was submitted therefore that, in the long run, the capital expenditure per million c.ft. in the new area now being developed would not be greater than in the older parts of the districts of the two Companies, allowing for the difference between pre-war and post-war costs. Further, extensions to the gas-works should cost less in proportion to the output as the total consumption grew. The establishment of new works in Welwyn Garden City would not appear to be justified unless economies could be secured, as compared with extensions of the existing works to meet the increasing demand. There was room for extension of the old works, and there seemed no point in proposing the erection of the new ones. The distance of the Garden City from the existing works was not abnormal in relation to the whole area of the two Companies. Again, the promoters seemed to have grossly under-estimated the growth of demand, and in ten years an additional 2000 consumers should be a minimum expectation. Thus the expenditure per million in ten years' time should be very much less than the promoters' estimate. The promoters also seemed to have ignored the prospect of the industrial demand for gas. The standard price of 16d. would entitle the Companies to a dividend of 1 p.ct. in excess of the proposed standard dividends of 10 and 7 p.ct. The 5s. slide appeared to be excessive on the 7 p.ct. shares. In view of the economies of amalgamation and the certainty of increased consumption, the standard price should be fixed at something less than the present adequately remunerative price.

Answering Mr. LEES, Mr. OSBORN said the chief reason why the Garden City Company had not proceeded with their own gas supply scheme was that they wanted all their available capital for their own development. It was extremely difficult to raise capital then. Money was being spent in all directions by the Company, and an additional sum for gas-works would have tied-up the capital account very seriously. He would submit the estimated cost of the undertaking to Mr. Honey.

Mr. LEES then ascertained that electricity was supplied in the Garden City by a subsidiary Company of the Garden City Company, a bulk supply being obtained from the North Metropolitan Power Supply Company. He pointed out that nearly every house had electric lighting, so that the Gas Companies would only get the heating and cooking load, while, at the same time, the Garden City Company were pushing electricity for heating and cooking

Mr. OSBORN said that every house, when built, was fitted for using gas. He estimated the average yearly consumption per house at 25,000 c.ft., whereas Mr. Evetts' figure was 20,000 c.ft.

Mr. LEES, referring to the price, said there was a breaking-point, and, sooner than give the supply on unremunerative terms, the Gas Companies would do without it. Where would the Garden City Company be then?

Mr. OSBORN did not contemplate such a contingency.

Mr. LEES, addressing Mr. Honey, emphasized that, but for the pressure brought to bear by the Welwyn Garden City Company, and the promise of support, the Gas Companies would never have contemplated the supply to the Garden City; and if the Garden City Company wished to force the thing through at a price which would be unremunerative, then, of course, it would not go on. The selling price could not be reduced below 15·2d. to-day, and the Garden City Company could not have supplied at that figure. He understood that the Garden City Company, or their subsidiary, had prohibited the use of gas for lighting on the estate.

Mr. OSBORN denied this. At the same time, he believed only about two houses used gas for lighting.

Mr. LEES said that the Garden City Company, by their demands, were getting very near to the figure which would necessitate the abandonment of the proposed amalgamation.

This closed the inquiry.

DOMESTIC HEATING.

Last Thursday, at the Y.M.C.A., Cardiff, Dr. Harold Hartley, the Chief Chemist of Messrs. Radiation Limited, delivered a lecture on "The Development of Gas for Domestic Heating." Mr. H. D. Madden, the Engineer and Manager of the Cardiff Gas Company, was in the chair, and was supported by Mr. R. J. Aukland, the Secretary, and Mr. D. T. Bell, the District Superintendent.

Dr. Hartley dealt with the most suitable means of transmitting heat to a living room, with special reference to the relative advantages of heating by radiation and convection.

He had come to the conclusion that heating by radiation was the better method in this country. If an incandescent source for heating was used, the body was suitably warmed, while the air remained cool. By breathing cool air one avoided that feeling of lassitude which set in when one remained in a room under "hot-house" conditions.

Speaking of coal fires, the lecturer said that it had been computed that 75 p.ct. of the fuel burnt in the domestic fireplace was wasted. This might have been justified in the past, but it was certainly not now, when there was in the gas fire an ideal means of heating living rooms, without harmfully affecting the surroundings.

Dr. Hartley then considered gas cooking. He described in detail the way in which the temperature of gas ovens is regulated. Big improvements, he said, had been made in design during the last few years, with the result that it was possible to-day to carry out cooking operations as cheaply as before the war. As a result of changes made in the most recent ovens, the amount of gas required to cook a given quantity of food had been reduced by 25 p.ct., and it had become possible to introduce automatic cooking, with its many advantages. He drew attention to the "Regulo" automatic controlling device, and said that so great were the advantages of this appliance that in a few years no high-grade cooker worthy of the name would be sold without some such device.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Conditions remain unchanged in this market, buyers continuing to supply their requirements from hand to mouth. Possibly there is rather more volume of trade about, and slightly less idle time, but there is still little prospect of prices improving to more payable levels while Germany can supply Continental requirements at well below English cost prices.

Either we shall have to produce more cheaply, or world demand will have to increase very considerably before any prosperity can be restored to our export trade. Perhaps a realization of economic facts has prompted the more reasonable attitude shown during the past week by the miners' leaders. It is to be hoped there will be less wild talk of demands which are obviously impossible in present circumstances. Even with prospects of settled conditions in the industry, the difficulties would be serious enough. As matters stand, with the threat of a serious stoppage later on, it cannot be expected that buyers will come in with contract orders, which would give some prospect of steady working of the pits.

The best that can be said is that matters are no worse than they have been, but there is no development in forward trade. Collieries consider themselves fortunate when they can see a week or so ahead. The spot demand for gas makes remains moderate. Wear Specials are nominally 22s. f.o.b., and best qualities 20s. 6d. to 21s. 6d., according to make and position. Others are 18s. to 18s. 6d. Unscreened coking brands are 17s 9d. to 18s. 3d., and bunkers are not quite so good as last week at 19s. 6d. to 19s. 9d. for best makes.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Market conditions remain unresponsive. There is no material change in the general level of prices; but with supplies plentiful and pits working under full time, spot lots are offered, in some cases, at substantially less than the ruling rates, according as collieries find it necessary to clear train loads of particular qualities to facilitate their operations. Transport is working better than was the case a few weeks ago, the weather having been favourable on the whole.

With regard to gas coal, negotiations have been opened in a few instances for annual contracts from June next. Gas undertakings expect to get easier terms than those made last summer, and they are encouraged in this by the prices at which those concerns which date their year from Jan. 1 have been able to buy. There is no measurable improvement in the demand for industrial fuel, taken as a whole. The firmer tendency in regard to nuts and slacks is fully maintained. Household coal is moving off very slowly for this season of the year, the position being in marked contrast to that which prevailed a year ago.

Conditions vary widely so far as gas coke is concerned. In areas which have a considerable industrial consumption the available supplies are being absorbed; but in no case is there any stringency, and some gas-works have difficulty in disposing of their output. The irregularity of price which this involves has not assumed any serious proportions, however. Producers of blast-furnace coke have been unable to maintain the increased prices which were obtained in some instances during December. Current rates are on about the same footing as those which came into operation for Midland blast-furnaces last October.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

Gas coal consumers are taking better deliveries against contracts, although open market prices are below those fixed for contract. There appears, however, to be a movement in some quarters to take advantage of the present position by fixing contracts for deliveries over six or twelve months to commence in a few months' time, and some business has already been negotiated on these lines.

There is no apparent improvement in the demand for household fuel; and although there are slight accumulated stocks at many collieries, these would be rapidly used up in the event of a snap of cold weather or an improvement in the demand for export, which at the moment appears far distant.

The export section continues under a cloud, the severe competition from Germany to the nearer continental markets having made it nearly impossible to do any volume of business, especially in industrial fuel.

Gas coke, both for home and foreign consumption, continues to decline in value, while furnace coke remains steady at figures below those generally anticipated some months ago.

Prices at Hull at the week-end were: Bunkers—Yorks, Derby, and Notts large screened steam, f.o.b. Humber ports, 17s. 6d. to 19s. 6d. Cargo for export, f.o.b. usual shipping ports—Best Yorks hards, Association, 22s. to 22s. 3d.; Derby best hards, 22s. to 22s. 3d.; West Yorks Hartleys, 18s. to 22s.; South Yorks washed doubles, 21s. 6d. to 22s. 6d.; South Yorks washed singles, 21s. 6d. to 22s.; dry doubles, 17s. to 18s.; South Yorks washed smalls, 16s. 3d. to 17s.; Derby slack, 1 inch, 11s. 9d. to 12s.; South Yorks rough slack, 12s. to 12s. 3d.; gas coke, 22s. 6d. to 24s.; foundry furnace coke, 22s. 3d. to 22s. 9d.; washed smithy peas, 23s. 6d. to 25s.; washed steam thirds, 20s. to 20s. 3d.; South Yorks washed trebles, 23s. per ton.

Blackpool Corporation Bill.—The Blackpool Town Council have confirmed a resolution regarding the Parliamentary Bill authorizing the Corporation to run omnibuses and enlarging their powers in respect of tramways, gas, and electricity. This procedure is interesting, in view of the negative votes recently experienced at the statutory meeting. Meanwhile a poll is being taken of the electors.

TRADE NOTES.

Glenboig Gas Retorts.

A new and interesting catalogue of their various refractories has been published by the Glenboig Union Fireclay Company, Ltd., No. 48, West Regent Street, Glasgow. One of the illustrations shows the condition of a retort bench at the Glasgow Corporation Gas-Works, built entirely of Glenboig retorts and bricks, after having been worked for 2380 days.

Refuse Destructors and Shaft Producers.

A notice recently appeared in the Technical Press concerning the refuse destructor at Davos. The Woodall-Duckham Companies, of No. 52, Grosvenor Gardens, London, S.W. 1, have acquired the whole rights for the British Empire of this system of refuse destruction from the Stettiner Chamotte-Fabrik Actien-Gesellschaft, together with the rights for the British Empire of their shaft producer. It is anticipated that in the near future destructor plants will be erected in this country.

CONTRACTS OPEN.

Fireclay and Silica Goods.

The Gas Committee of the Silsden Urban District Council invite tenders for the supply and delivery of fireclay and silica goods to their gas-works. (See advert. on p. 231.)

Resetting Retorts, &c.

The Cleator Moor Urban District Council are inviting tenders for the resetting of one bed of seven retorts, including producer arch and combustion chamber, and one bed of six retorts with producer and step grate. (See advert. on p. 231.)

EXTENSIONS.

Additional Storage at Newbury.

The Gas Committee of the Newbury Corporation have arranged to have a two-lift gasholder, erected by Messrs. Willey & Company in 1880, repaired, and an additional lift, which will increase the capacity from 160,000 c.ft. to 240,000 c.ft., added. The work will be undertaken by Messrs. Firth Blakeley, Sons, & Co., Ltd., of Leeds.

Additional Plant at Cowdenbeath.

Because of the increase of business caused by the erection of many houses by private enterprise, the Cowdenbeath Gas Company have been compelled to add considerably to their gas-making plant. The extension includes a large gasholder to be erected at their works at the end of Union Street, plans for which were passed at a recent sitting of Cowdenbeath Dean of Guild Court. The holder is a three-lift one, and will have a holding capacity of half-a-million cubic feet. The present holder has a capacity of 150,000 c.ft. The work is to be commenced immediately.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 26.

Pitch continues quiet, and little business is reported. The price is nominally 50s. to 52s. 6d. per ton at makers' works.

Creosote is rather quieter, but remains steady at about 7½d. per gallon net and naked at makers' works.

Solvent naphtha (95-160) is firm at about 1s. 8d. per gallon.

Pure benzole and pure toluole are about 1s. 10d. per gallon.

Tar Products in the Provinces.

Jan. 26.

The markets for tar products generally have been quiet throughout the past week.

Pitch is very dull indeed, and business has been done on the Continent at equal to 45s. f.o.b. Sales on this side were reported at the beginning of the week at 45s. 6d., and since then it is stated that 44s. has been accepted.

Creosote is steady. Prices are unchanged; but there is still a very good demand.

White products are without change, and there is a good demand at fair prices.

Naphthalene and anthracene are still practically unsaleable.

In carbolic, the demand from the Continent is not so good, and prices are lower.

Cresylic acid is quiet.

The average values for gas-works products during last week were: Gas-works coal tar, 33s. to 38s. Pitch, East Coast, 44s. to 45s. f.o.b. West Coast—Manchester, 39s. to 40s.; Liverpool, 40s. to 41s.; Clyde, 43s. to 44s. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8¼d.; crude, 65 p.ct. at 120° C., 9¼d. to 10¼d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s 7½d. to 1s. 8¼d., nominal. Coal-tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 6¾d. to 7d.; salty, 6⅝d. to 6¾d.; Scotland, 6¾d. to 6⅞d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 9d. to 1s. 10d. prompt. Naphthalene, £12 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 3d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

Jan. 22.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of December was £2 12s. 10·52d.

Ascot District Gas and Electricity Company.—The tenders for £34,288 6 p.ct. irredeemable preference capital which Messrs. A. & W. Richards offered for the Company were opened on Jan. 22. The issue was more than twice covered at prices ranging from £11 3s. down to the minimum of par; and the average price obtained was £10 3s. 9d. per £10 share.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange remained quiet during the past week, the "account" dominating the situation. The heavy speculation during the early days of the month caused some anxiety, but the settlement was carried through with only one unimportant failure.

British Government Stocks continued to be well supported, and it was rumoured that there were some very large transactions during the week. Trustees are finding it increasingly difficult to acquire stocks which will show a yield approaching 5 p.c., owing to the majority of the Home Government and Colonial stocks with a high yield being either quoted above par or not having the necessary number of years to elapse before possible redemption.

In the Foreign Market European construction loans appreciated, especially those of Austria and Hungary. Although Home Rails are not in favour at the moment, it is anticipated that there will be some big issues shortly. Discriminating trustees will not have overlooked the attraction of the 5 p.c. London, Midland, and Scottish Preference stock issue to the existing stockholders, in respect of which the lists closed on Tuesday.

No outstanding feature was noticeable in the Industrial Market. Textiles and Iron, Coal, and Steel were depressed, but Brunner Monds were in good request.

The dividend announcement of the Gas Light and Coke Company is at the full statutory rate of 5½ p.c. per annum, as expected, and although the "carry forward" has been slightly reduced, they would appear to have had a successful year. The yield at the present average price of 98, after allowing for the dividend payment, is 5·59 p.c. In view of the proximity of dividend distributions by the majority of companies, there were fewer transactions in the Gas Market last week; an exception, however, was Primitiva ordinary, and the price hardened a further 6d.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 66, 66¼, 67, British 117, Cape Town 4½ p.ct. 1st mort. debenture 73, Continental Union 7 p.ct. preference 91, Gas Light and Coke 97⅞, 97⅞, 98½, 4 p.ct. preference 80, 3 p.ct. debenture 61, Primitiva 10s. 3d., 4 p.ct. 1st debentures 79, South Metropolitan 101½, 101⅝, 102½, 3 p.ct. debenture 61, 61½ *ex* div. Supplementary prices, Brentford 6 p.ct. mortgages 100, 100¼, Liverpool 5 p.ct. ordinary 93.

On Tuesday, Alliance and Dublin 66, 66⅜, 4 p.ct. debenture 64 9/16 *ex* div., Brentford "A" 115, Commercial 4 p.ct. 95½, 96, Continental Union 42, Gas Light and Coke 97⅛, 97⅜, 98, 98½, 3½ p.ct. maximum 64¾, 4 p.ct. preference 81, 3 p.ct. debenture 61¾, Primitiva 10s., 10s. 3d., 4 p.ct. 1st debentures 78½, 78¾, South Metropolitan 101½, 101⅝, 102½, 6½ p.ct. debenture 105½, South Suburban 109½. Supplementary prices, Kingston-upon-Thames 106½.

On Wednesday, British 117, 119, Commercial 3½ p.ct. 95¾, European 8¾, Gas Light and Coke 97⅞, 98, 98¼, 98½, 4 p.ct. preference 80, 3 p.ct. debenture 60½, Primitiva 10s. 1½d., 10s. 3d., 10s. 3¼d., 10s. 4½d., 10s. 6d., 10s. 7¼d, 4 p.ct. 1st debentures 79½, South Metropolitan 6½ p.ct. debenture 105½. Supplementary prices, Aldershot 4 p.ct. debenture 76, 77, Leatherhead new 4 p.ct. debenture 75.

On Thursday, Bombay 5 1/16, Bournemouth "B" £12 15s. 6d., £12 16s. 9d., Brentford "B" 113, European 9 *ex* div., Gas Light and Coke 98, 98⅜, 98½, 3½ p.ct. maximum 64¾, 64⅞, 65⅛, 4 p.ct. preference 81, Imperial Continental 179½, Oriental 101½, 102¼, Primitiva 10s. 3d., 10s. 6d., 10s. 7¼d., 4 p.ct. debenture (1911) 64 *ex* div., South Metropolitan 101½, 102, 102½, 103½, 3 p.ct. debenture 61, Tottenham "B" 102½, 4 p.ct. debenture 77. Supplementary prices, Gas Light and Coke 10 p.ct. bonds 182.

On Friday, Brentford "A" 114, 6 p.ct. Richmond debenture 103, Commercial 4 p.ct. 96, 3 p.ct. debenture 58, European 8½, 8⅞, £8 11s. 0d. *ex* div., Gas Light and Coke 97½, 97⅞, 98, 98¼, 98½, 3½ p.ct. maximum 65, 65⅛, 4 p.ct. preference 80½, 3 p.ct. debenture 61, Imperial Continental 179½, 182, Primitiva 10s. 6d., South Metropolitan 102½, 103. Supplementary prices, Croydon 7½ p.ct. preference 105½, Leatherhead 5 p.ct. 11⅛, 11⅝.

In the Money Market, the restoration of a free gold market is being generally advocated, and the return of sterling to parity is regarded as a certainty. Conditions were comfortable in the short loan market at the end of the week, and towards the close lenders accepted 2½ p.ct. for overnight accommodation. Discount quotations were easier, and the average rate at which Treasury Bills were allotted was £3 14s. 6·79d. p.ct., or 3½d. below the rate for the previous week.

The further improvement in sterling on New York was again the feature of the Foreign Exchange Market last week, and a new high record—4·80⅜—was reached on Friday, the final quotation on Saturday being 4·80 5/16. French francs closed at 88·80, Belgian francs at 94, and Italian lire at 116¼, all of which were cheaper on the week.

The cash price of silver fell slightly on the week, and closed at 32d. per oz., against 32⅛d. per oz. last week.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Jan. 23.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C.	80—83	..	..
235,492	,,	,,	4	4	Do. 4 p.c. Pref.	72—77	..	..
1,551,868	,,	Sept. 25	6	6½	Alliance & Dublin Ord.	64—69	..	66—67
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	61—66 9/16	..	64 5/16
300,000	5	Oct. 23	8	8	Bombay, Ltd.	5—5⅛	..	5⅛
100,000	10	Aug. 14	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12½—13	..	£12/15/6 £12/16/9
150,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅝—11⅝	..	..
50,000	Stk.	Jan. 8	3	3	Do. 3 p.c. Deb.	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	76—79	..	..
992,045	,,	July 10	6 3/16	6 3/16	Brentford A Con.	112—117	..	114—115
990,500	,,	,,	6⅜	6⅜	Do. B New	112—117	..	113
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	89—94	..	..
306,690	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	103
214,740	,,	Aug. 28	11½	11½	Brighton & Hove Orig.	170—175	..	..
244,200	,,	,,	8½	8½	Do. A Ord.	125—128	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	95—96*a*	..	..
855,000	,,	Sept. 25	7	8	British Ord.	115—120	..	117—119
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	123—128	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	..
100,000	10	Dec. 18	8	6	Cape Town, Ltd.	6½—7⅛	..	..
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	71—76	..	73
626,860	,,	July 24	6	6	Cardiff Con. Ord.	97—100	..	..
237,860	,,	Jan. 8	7⅛	7⅛	Do. 7⅛ p.c. Red. Deb.	105—108	..	..
137,150	,,	Aug. 14	6⅛	5	Chester 5 p.c. Ord.	91—96*b*	..	..
1,513,280	,,	July 24	6	6	Commercial 4 p.c. Cap.	94—97	..	95½—96
560,000	,,	,,	6	6	Do. 3½ p.c. Cap.	91—97	..	95½
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	57—60	..	58
800,000	,,	14 Jan. 25	—	—	Continental Union, Ltd.	40—45	..	42
200,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	88—92	..	91
660,000	,,	Aug. 28	6½	6½	Croydon sliding scale	102—105	..	..
284,975	,,	,,	5	5	Do. max. div.	84—87	..	..
492,270	,,	Aug. 28	9	6	Derby Con.	107—110*c*	..	..
55,000	,,	Jan. 8	4	4	Do. Deb.	74—76*	..	..
1,002,180	1.	July 24	2	6	European, Ltd.	8¼—9½	..	8⅝—9
16,503,045	Stk	Aug. 14	5½	5½	Gas Light & Coke 4 p.c. Ord.	97—99	..	97⅛—98½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63—66	−½	64⅛—65½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	79—81	..	80—81
4,761,930	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	59—62	..	60½—61½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	182
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 11	6½	6½	Hastings & St. L. 5 p.c. Conv.	95—100	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	75—80	..	..
70,000	10	Sept. 25	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Aug. 14	10	10	Hornsey 7 p.c.	138—143	..	..
1,976,000	,,	Nov. 20	30	10	Imperial Continental Cap.	177—182	..	179½—182
263,950	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Aug. 14	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Aug. 14	5½	5½	Liverpool 5 p.c. Ord.	93¼—93½*b*	−1/16	93⅛—93½
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	106—109*b*	..	..
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap.	125—135	..	..
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 4	7	5	Malta & Mediterranean	3½—3¾	..	..
547,920	Stk.	Nov. 20	4	4	Montevideo, Ltd.	60—65	..	..
1,875,892	,,	July 24	5½	5	Newcastle & Gateshead Con.	86¼—87½*d*	..	..
250,166	,,	,,	4	4	Do. 4 p.c. Pref.	74—75*d*	..	..
329,705	,,	Dec. 18	3½	3½	Do. 3½ p.c. Deb.	68—69*d*	..	..
15,000	10	Aug. 28	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	,,	7 1/16	7 1/16	Do. 7 p.c.	11¼—11¾	..	..
300,000	Stk.	Dec. 4	7	9	Oriental, Ltd.	100—105	..	101½—102½
138,120	,,	Jan. 8	7¼	7½	Plym'th & Ston'house 5 p.c.	109—114	..	..
60,000	50	Aug. 28	13	13	Portsea Island B	99—102	..	..
100,000	50	,,	12	12	Do. C	95—100	..	..
1,289,909	1	,,	—	—	Primitiva Ord.	10/—11/—	+3/16	10/—10/7½
311,100	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	78—80	+1½	78½—79½
600,000	Stk.	Jan. 22	4	4	Do. 4 p.c. Red. Deb. 1911	63—65*	..	64
220,335	,,	Dec. 18	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	7¼—7¾	..	..
125,000	50	Jan. 2	5	5	Do. 5 p.c. Red. Deb.	41—43	..	..
270,000	Stk.	Aug. 28	5/8/4	5⅛	Sheffield A	104—106*s*	..	..
419,968	,,	,,	5/8/4	5⅛	Do. B	104—106*s*	..	..
1,047,000	,,	,,	5/8/4	5⅛	Do. C	104—106*s*	..	104
90,000	10	Oct. 23	8	6	South African	7—9	..	..
6,609,895	Stk.	Aug 14	6½	5	South Met. Ord.	101½—103½	+½	101½—103½
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb.	59—62	..	61—61½
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Deb.	104—106	..	105½
91,500	,,	Aug. 28	8½	8½	South Shields Con.	137—139*d*	..	..
1,087,795	,,	Aug. 14	6½	6½	South Suburban Ord. 5 p.c.	107—112	..	109½
368,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	94—99	..	..
647,740	,,	Nov. 6	3	3	South'mpt'n Ord. 5 p.c. max.	83—86	..	..
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	72—77	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	..
120,000	,,	July 24	8	8	Tottenham District A 5 p.c.	119—122	..	..
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	102—105	..	102½
181,255	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—79	..	77
258,251	,,	Aug. 28	7/14/4	5	Tynemouth Con. and New Uxbridge, Maidenhead, &	84—86*d*	..	..
187,294	,,	Aug. 28	6½	6½	Wycombe 5 p.c.	102—107	..	..
68,330	,,	Aug. 28	—	5	Do. 5 p.c. pref.	95—100	..	..
91,800	,,	—	—	—	Do. 5 p.c. Maidenh'd	93—98	..	..
30,000	,,	July 10	9½	9½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	140—145	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.c.	120—125	..	..
108,075	,,	,,	6/7/9	6/9/6	Do. C	102—107	..	..
240,865	,,	,,	6/7/9	6/9/6	New Ordinary	..	..	..
382,000	,,	,,	7½	7½	Wimbledon 5 p.c.	116—121	..	..
50,000	,,	,,	7½	7½	Epsom 5 p.c.	122—127	..	..
38,426	,,	Dec. 18	3	3	5 p.c. Deb.	57—60	..	..

Quotations at:—*a*,—Bristol, *b*,—Liverpool, *c*.—Nottingham, *d*.—Newcastle, *s*,—Sheffield. * Ex. div.

Reduction in Price at Oswestry.—The Directors of the Oswestry Gas Light and Coke Company, Ltd., have reduced the price of gas by 5d. per 1000 c.ft. The charge is now 5s., and with an average discount of 7½ p.ct., it is 4s. 7½d. net per 1000 c.ft.

Whitchurch (Salop) Gas Company, Ltd.—The Directors' report of the working of the Company for the year ended Dec. 31 last shows that the sales of gas have been well maintained. There has been a good demand for coke, but tar and liquor have been difficult to dispose of. A final dividend at the rate of 6 p.ct. (less income-tax) is recommended. The Directors announce a reduction in the price of gas of 1d. per therm as from Jan. 1; this being the third year in succession that a reduction in the charge of this amount has been made.

Forwarding a copy of their balance-sheet for the year ended Dec. 31, Messrs. Ewart and Son, Ltd., of Euston Road, London, N.W., draw attention to the fact that dividends in respect of the year 1924 have been declared and paid as follows: On preference shares, at the rate of 16 p.ct. per annum (£16,112, less income-tax); on ordinary shares, an interim dividend at the rate of 16 p.ct. per annum (£7899, less income-tax); and a final dividend at the rate of 30 p.ct. per annum (£19,254, less income-tax), making a total distribution upon the ordinary shares at the rate of 55 p.ct. for the year (£27,153, less income-tax); on management shares, £19,254 (less income-tax), being one-half the surplus profits distributed after payment of 16 p.ct. upon the preference shares and 16 p.ct. upon the ordinary shares for the year. The sum of £2046 has been carried forward, against the sum of £1767 brought in.

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